



# SIGNALS INTELLIGENCE (SIGINT) IN SOUTH ASIA

*India  
Pakistan  
Sri Lanka (Ceylon)*



Canberra Papers on  
Strategy and Defence  
No. 117

*Desmond Ball*





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Telephone (06) 2438555  
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## ABSTRACT

This monograph is a study of signals intelligence (SIGINT) activities in South Asia. It describes the history of these activities from the early stations set up in India by the British, through intelligence operations during the Second World War and during the three India-Pakistan wars, to Sri Lanka's operations against Tamil militants. It also describes the higher command and management structures and the intelligence establishments in India, Pakistan and Sri Lanka; the organisational aspects of the numerous agencies involved in SIGINT activities, and their facilities and capabilities; and it discusses the efficiency of the SIGINT organisations in the three countries, as well as their operational effectiveness.

**Professor Desmond Ball** is a professor in the Strategic and Defence Studies Centre at the Australian National University. He is the author of more than 200 academic monographs and articles on nuclear strategy, nuclear weapons, national security decision-making, security developments in the Asia-Pacific region, and Australia's defence policy. His major books include *Politics and Force Levels: The Strategic Missile Program of the Kennedy Administration* (University of California Press, Berkeley, 1980); *A Suitable Piece of Real Estate: American Installations in Australia* (Hale & Iremonger, Sydney, 1980); *A Base for Debate: The US Satellite Station at Nurrungar* (Allen & Unwin, Sydney, London and Boston, 1987); *Pine Gap: Australia and the US Geostationary Signals Intelligence Satellite Program* (Allen & Unwin, Sydney, 1988); and *Signals Intelligence in the Post-Cold War Era: Developments in the Asia-Pacific Region* (Institute of Southeast Asian Studies (ISEAS), Singapore, 1993). He is the co-author of *The Ties That Bind: Intelligence Cooperation Between the UKUSA Countries* (George Allen & Unwin, Sydney, London and Boston, 1985, 2nd edn 1990); *Defend the North: The Case for the Alice Springs-Darwin Railway* (George Allen & Unwin, Sydney, 1985); *Crisis Stability and Nuclear War* (American Academy of Arts and Sciences, and Cornell University Peace Studies Program, Ithaca, New York, 1987); and *Presumptive Engagement: Australia's Asia-Pacific Security Policy in the 1990s* (Allen & Unwin in assoc. with the Department of International Relations, Australian National University, Sydney and Canberra, 1996). He is editor of *The Future of Tactical Air Power in the Defence of Australia* (Australian National University, Canberra, 1977); *Strategy & Defence: Australian Essays* (George Allen & Unwin, Sydney, 1982); *The ANZAC Connection* (George Allen & Unwin Sydney, 1985); *Air Power: Global Developments and Australian Perspectives* (Pergamon Brassey's Defence Publishers, Sydney, 1988); *Aborigines in the Defence of Australia* (Australian National University Press, Sydney, 1991); and *The Transformation of Security in the Asia/Pacific Region* (Frank Cass, London, 1996). He is co-editor of *Problems of Mobilisation in the Defence of Australia* (Phoenix Defence Publications, Canberra, 1980); *Civil Defence and Australia's Security in the Nuclear Age* (Strategic and Defence Studies Centre, Australian National University, Canberra, and George Allen & Unwin, Sydney, 1983); *Strategic Nuclear Targeting* (Cornell University Press, Ithaca, New York, 1986); *A Vulnerable Country? Civil Resources in the Defence of Australia* (Australian National University Press, Canberra, 1986); *The Future of Arms Control* (Australian National



University Press, Sydney, 1986); *Geographic Information Systems: Defence Applications* (Pergamon Brassey's Defence Publishers, Sydney, 1989); *Security and Defence: Pacific and Global Perspectives* (Allen & Unwin, Sydney, 1990); and *Strange Neighbours: The Indonesian-Australian Relationship* (Allen & Unwin, Sydney, 1991).

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# CONTENTS

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Figures

Table

Acronyms and Abbreviations

Introduction	1
1 Signals Intelligence (SIGINT) in India	3
2 Signals Intelligence (SIGINT) in Pakistan	41
3 Signals Intelligence (SIGINT) in Sri Lanka	63
Bibliography	103
Strategic and Defence Studies Centre	112

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# FIGURES

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1.1	SIGINT Stations in South Asia, 1904-45	4
1.2	Sena Bhavan, Delhi, Headquarters of the Indian Signals Intelligence Directorate	17
1.3	Indian Airborne SIGINT: Main Operating Bases	21
2.1	SIGINT Stations in Pakistan, 1904-45	42
3.1	SIGINT Stations in Ceylon, 1940-45	65
3.2	Evaluation of FECB from Singapore to Colombo, Admiralty Message, 27 December 1941	66
3.3	Evaluation of FECB from Singapore to Colombo, Admiralty Message, 27 April 1942	67
3.4	Colombo Intercept, 13 February 1942	70
3.5	Colombo Intercept, 26 February 1942	71
3.6	Colombo Intercept, 26 February 1942	72
3.7	Colombo Intercept, 27 February 1942	73
3.8	Colombo Intercept, 1 March 1942	74
3.9	Sri Lanka's Security and Intelligence Structure	85
3.10	Insurgent Signals and SIGINT Sites, 1987-91	86

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# TABLE

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2.1	Directors-General, Inter-Services Intelligence (ISI), 1980-94	55
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## ACRONYMS AND ABBREVIATIONS

ACSEA	Air Command South East Asia
AFSS	Air Force Security Service
AIRMS	All-India Radio Monitoring Service
ALFSEA	Allied Land Forces South East Asia
ARC	Aviation Research Centre
ASEAN	Association of Southeast Asian Nations
ASW	anti-submarine warfare
AWACS	airborne warning and control system
BP	Bletchley Park
BSF	Border Security Force
CB	citizens' band
CDAA	circularly disposed antenna array
CIA	Central Intelligence Agency
CMIA	Chief Military Intelligence Advisor
CMO	Central Monitoring Organisation
COMINT	communications intelligence
COMSAT	communications satellite
COMSEC	communications security
DRDO	Defence Research and Development Organisation
DERL	Defence Electronic Research Laboratory
DF	direction finding
DMI	Directorate of Military Intelligence
DSB	Defence Signals Bureau
ECIL	Electronics Corporation of India Limited
ELINT	electronic intelligence
EPRLF	Eelam People's Revolutionary Liberation Front
EROS	Tamil Revolutionary Organisation of Students
ESM	electronic support measure(s)
ETS	Electronic Technical Section
EW	electronic warfare
EWSC	Eastern Wireless Sub-Centre
FECB	Far East Combined Bureau
FM	frequency modulation (radio)
FRUMEL	Fleet Radio Unit, Melbourne
GCCS	Government Code and Cypher School
GHQ	general headquarters
GHz	gigahertz



GRU	Chief Intelligence Directorate
HQ	high frequency
HQ	headquarters
HUMINT	human intelligence
IAF	Indian Air Force
IB	Intelligence Bureau
IBP	Intelligence Bureau of Pakistan
IBS	Intelligence Branch at Simla
IMINT	imagery intelligence
INMARSAT	International Maritime Satellite
IPKF	Indian Peace-Keeping Force
ISI	Inter-Services Intelligence
ISRO	Indian Space Research Organisation
ISSU	Inter-Services Signals Unit
ISWS	Indian Special Wireless Section
ITU	International Telecommunication Union
IWIS	Indian Wireless Intelligence Service
JCEC	Joint Committee on Electronics and Communications
JIC	Joint Intelligence Committee
JSIB	Joint Services Intelligence Bureau
JVP	Janatha Vimukthi Peramuna (Sinhala Marxist Party)
KGB	Committee for State Security
KHAD	Khidamate Aetilaati Daulati (Afghani security and intelligence organisation)
kHz	kilohertz
km	kilometre(s)
LF	low frequency
LTTE	Liberation Tigers of Tamil Eelam
MF	medium frequency
MI	Military Intelligence
MID	Military Intelligence Directorate
NCO	non-commissioned officer
NEI	Netherlands East Indies
NIB	National Intelligence Bureau
NSA	National Security Agency
NSG	National Security Guards
OB	order of battle
OFC	Overall Force Commander
ORBAT	order of battle
PAF	Pakistan Air Force

PHOTINT	photographic intelligence
PLOTE	People's Liberation Organisation of Tamil Eelam
PPP	Pakistan People's Party
R/T	radio telephony
RAF	Royal Air Force
RAW	Research and Analysis Wing
RFP	Radio Finger-Printing
RMS	root mean square
SATCOM	satellite communications
SCU	Special Communications Unit
SEAC	South East Asia Command
SFF	Special Frontier Force
SID	Signals Intelligence Directorate
SIGINT	signals intelligence
SIGSEC	signals security
SLU	Special Liaison Unit
SPG	Special Protection Group
SSO	Special Security Officer
TELINT	telemetry intelligence
TELO	Tamil Eelam Liberation Organisation
UHF	ultra high frequency
UK	United Kingdom
UKUSA	United Kingdom and United States security arrangements
US	United States
USAFSS	US Air Force Security Service
USEUCOM	US European Command
USSR	Union of Soviet Socialist Republics
VHF	very high frequency
VIP	very important person
VoA	Voice of America
W/T	wireless telegraphy
WEC	Wireless Experimental Centre
WED	Wireless Experimental Depot
WPC	Wireless Planning and Coordination Cell
WU	Wireless Unit
WWSC	Western Wireless Sub-Centre

## INTRODUCTION

Signals intelligence (SIGINT) activities in South Asia date back to the very beginning of the SIGINT age. Before the First World War, Britain had established SIGINT stations at Simla in India and Abbottabad in the North-West Frontier (and now in Pakistan) to intercept communications from as far afield as Persia (Iran), Russia, Azerbaijan, China, Burma and Southeast Asia. During the Second World War, SIGINT activities in India and Ceylon were extremely important in the British operations against Japanese forces on the western side of Southeast Asia. British SIGINT activities were maintained in South Asia after the war, but were discontinued when India and Pakistan gained their independence in 1947 and Ceylon (Sri Lanka) in 1948.

India and Pakistan, however, moved fairly quickly after they achieved independence to establish indigenous SIGINT capabilities and operations. During the first India-Pakistan war (October 1947-December 1948), both the Indian and Pakistani armies utilised SIGINT in important tactical operations. In the second and third India-Pakistan wars (August-September 1965 and December 1971), SIGINT provided both India and Pakistan with extensive and often extremely important intelligence at the strategic, operational and tactical levels.

The Pakistani SIGINT establishment is probably the most cost-effective in the region. In comparison, for example, India's SIGINT establishment is several times larger in terms of personnel and resources, but the performance of the Pakistani SIGINT establishment is probably just as good. The Indian SIGINT effort lacks coordination and has become too politicised, and needs to be profoundly reconstituted if it is to become more effective.

Sri Lanka's SIGINT capabilities are quite rudimentary, but they have been critical in the government's successes against the Tamil militants in northeast Sri Lanka, who have been fighting for an independent Tamil homeland since the early 1980s, but who have used unsophisticated radio communication systems and poor communications security (COMSEC). The second half of chapter 3 provides an interesting study of the role of SIGINT in counter-insurgency warfare.

## 2 Signals Intelligence (SIGINT) in South Asia

This monograph describes the history of SIGINT activities in South Asia. It describes the higher command and management structures and the intelligence establishments in India, Pakistan and Sri Lanka, the organisational aspects of the numerous agencies involved in SIGINT activities, and their facilities and capabilities. And it discusses the efficiency of the SIGINT organisations in the three countries, as well as their operational effectiveness.

This monograph is a product of a broader and long-standing interest in signals intelligence (SIGINT) activities in the Asia-Pacific region.<sup>1</sup> Versions of the three chapters of which it is comprised were previously published as 'Signals Intelligence in India', *Intelligence and National Security*, Vol.7, No.8, August 1995; 'Signals Intelligence (SIGINT) in Pakistan', *Strategic Analysis*, Vol.XVIII, No.2, May 1995; and 'Signals Intelligence (SIGINT) in Sri Lanka', *Strategic Analysis*, Vol.XVIII, No.8, November 1995. They have, however, been revised and updated.

Desmond Ball  
August 1996

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<sup>1</sup> Other associated products include *Pine Gap: Australia and the US Geostationary Signals Intelligence Satellite Program* (Allen & Unwin, Sydney, 1988); *Signals Intelligence in the Post-Cold War Era: Developments in the Asia-Pacific Region* (Institute of Southeast Asian Studies, Singapore, 1993); *Soviet SIGINT: Hawaii Operation*, Canberra Papers on Strategy and Defence No.80 (Strategic and Defence Studies Centre, Australian National University, Canberra, 1991); *Signals Intelligence (SIGINT) in South Korea*, Canberra Papers on Strategy and Defence No.110 (Strategic and Defence Studies Centre, Australian National University, Canberra, 1995); *Soviet Signals Intelligence (SIGINT): Listening to ASEAN*, Working Paper No.188 (Strategic and Defence Studies Centre, Australian National University, Canberra, September 1989); 'Signals Intelligence in China', *Jane's Intelligence Review*, Vol.7, No.8, August 1995; 'Signals Intelligence in Taiwan', *Jane's Intelligence Review*, Vol.7, No.11, November 1995; *Developments in Signals Intelligence and Electronic Warfare in Southeast Asia*, Working Paper No.290 (Strategic and Defence Studies Centre, Australian National University, Canberra, 1995); *Signals Intelligence (SIGINT) in North Korea*, Working Paper No.295 (Strategic and Defence Studies Centre, Australian National University, Canberra, June 1996); and 'Over and Out: Signals Intelligence (SIGINT) in Hong Kong', *Intelligence and National Security*, Vol.11, No.3, July 1996.



## CHAPTER 1

### SIGNALS INTELLIGENCE (SIGINT) IN INDIA

SIGINT activities have been conducted from the Indian subcontinent since the very beginning of the SIGINT age, when Britain established sites for monitoring communications from as far afield as Persia (Iran), Russia, Azerbaijan, Afghanistan, China, Burma and Southeast Asia. In 1904, the Indian Intelligence Branch at Simla (IBS) embarked on SIGINT operations against Russian military and consular traffic and Chinese diplomatic traffic.<sup>1</sup> A station was also established at Abbottabad, some 50 km north of Islamabad, Pakistan, to intercept and read Persian, Afghan and Russian signals.<sup>2</sup> During the First World War, the Indian Army founded a special bureau for dealing with Persian, Afghan and Russian signals which concerned India itself, which continued operating throughout the inter-war period.<sup>3</sup> After the First World War, the Royal Corps of Signals established a SIGINT station at Jubbulpore in the middle of India.<sup>4</sup> In addition, 'some smaller, mobile intercept posts were established in a few mountain fortresses on India's North-West Frontier, which were to prove extremely useful'.<sup>5</sup>

During the Second World War, India served as a critical area for British SIGINT operations, providing strategic intelligence to London concerning Japanese activities in Southeast Asia and strategic and operational intelligence directly to the headquarters of Lord Louis Mountbatten's South East Asia Command (SEAC) near Kandy in south-central Ceylon. Some two dozen major British SIGINT stations were operational in the sub-continent in 1942-45, as well as numerous mobile SIGINT units which served the Burma theatre in 1942-45;

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<sup>1</sup> Christopher Andrew, *The Growth of Intelligence Collaboration in the English-Speaking World*, Working Papers No.83 (International Security Studies Program, The Wilson Center, Washington DC, 1987), p.3.

<sup>2</sup> Alan Stripp, *Codebreaker in the Far East* (Frank Cass, London, 1989), p.50.

<sup>3</sup> A.G. Denniston, 'The Government Code and Cypher School between the Wars' in Christopher Andrew (ed.), *Codebreaking and Signals Intelligence* (Frank Cass, London, 1986), p.61.

<sup>4</sup> Nigel West, *GCHQ: The Secret Wireless War, 1900-86* (Weidenfeld and Nicolson, London, 1986), p.75.

<sup>5</sup> *ibid.*, p.76.

#### 4 Signals Intelligence (SIGINT) in South Asia

Figure 1:1: SIGINT Stations in South Asia, 1904-45





several thousand personnel were involved in these SIGINT operations.<sup>6</sup>

The principal SIGINT station in India during the Second World War was the Wireless Experimental Centre (WEC) at Delhi, also designated 164 Signal Wing, RAF. On the one hand, the WEC operated as an 'outstation' of the Government Code and Cypher School (GCCS) at Bletchley Park, the British government's SIGINT organisation.<sup>7</sup> On the other hand, operational control was exercised through the Indian Wireless Intelligence Service (IWIS), in turn controlled by GHQ India in Delhi.<sup>8</sup> The WEC was located on 'a hilly, isolated site' at Anand Parbat, on the southwest outskirts of the city.<sup>9</sup> More than a thousand people worked at the WEC, including British Army and RAF personnel, Indian service personnel, and Indian civilian wireless operators.<sup>10</sup> (Also located in Delhi during the Second World War was 'a large US signals intelligence unit, generously staffed and provided'.)<sup>11</sup>

The WEC in turn 'had two large outstations' - the Western Wireless Sub-Centre (WWSC) at Bangalore, inland from Madras in south India, and the Eastern Wireless Sub-Centre (EWSC) at Barrackpore near Calcutta.<sup>12</sup> The Bangalore station, which had extensive intercept, cryptographic and DF capabilities, was initially located on the northern outskirts of the city; in 1944-45, 'a new and larger station' was constructed near Yallahanka, some 18 miles north of

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6 The fullest accounts of British SIGINT operations in India during the Second World War are Hugh Skillen, *Knowledge Strengthens the Arm: The Background to the Training of Intelligence Officers in the Intelligence Corps in the Second World War* (Hugh Skillen, Pinner, Middlesex, 1991), chapter 22; Hugh Skillen, *Spies of the Airwaves: A History of the Y Sections during the Second World War* (Hugh Skillen, Pinner, Middlesex, 1989), chapters 28 and 29; Stripp, *Codebreaker in the Far East*, chapters 4 and 5; Alan Stripp, 'Japanese Army Air Force Codes at Bletchley Park and Delhi' in F.H. Hinsley and Alan Stripp (eds), *Codebreakers: The Inside Story of Bletchley Park* (Oxford University Press, Oxford, 1993) chapter 29; and Geoffrey St. Vincent Ballard, *On Ultra Active Service: The Story of Australia's Signals Intelligence Operations during World War II* (Spectrum Publications, Richmond, Victoria, 1991), chapter 34.

7 Stripp, 'Japanese Army Air Force Codes at Bletchley Park and Delhi', p.291.

8 Skillen, *Knowledge Strengthens the Arm*, p.423.

9 Skillen, *Spies of the Airwaves*, p.514; Skillen, *Knowledge Strengthens the Arm*, p.431; and Stripp, *Codebreaker in the Far East*, p.39.

10 Stripp, *Codebreaker in the Far East*, p.41.

11 Stripp, 'Japanese Army Air Force Codes at Bletchley Park and Delhi', p.291.

12 *ibid.*

## 6 Signals Intelligence (SIGINT) in South Asia

Bangalore.<sup>13</sup> The principal mission of the WWSC was to monitor Japanese communications in the Malaya and Sumatra areas.<sup>14</sup> The EWSC at Barrackpore focused on the Burma theatre. In addition to its own intercept, DF and cryptographic activities, the Barrackpore station also controlled a network of intercept and DF stations at Tezpur (which was established in December 1942), Dusi, Akyab (Sittwe) and Imphal, for monitoring Japanese activities in Burma.<sup>15</sup> SIGINT from 'forward intercept and D/F stations' at Comilla and Cox's Bazaar near the border with Burma, in what is now Bangladesh, was also 'fed in to EWSC'.<sup>16</sup> Also serving this DF chain was the SIGINT station at Abbottabad.<sup>17</sup> Other SIGINT stations which served the Burma theatre were located at Shillong, Chittagong, Shenan and Sibong.<sup>18</sup>

Other major SIGINT stations in India during the war included intercept and DF stations at Calcutta and Vishakhapatnam;<sup>19</sup> a RAF intercept and DF station at Ranchi;<sup>20</sup> a Royal Navy DF station at Madras;<sup>21</sup> and a Royal Navy SIGINT/DF station at Bombay Fort, Bombay, on the Arabian Sea.<sup>22</sup>

A large number of Indians played roles in this activity. At WEC in Delhi itself, Indian civilian wireless operators comprised 'the intercept crews on whose skills the whole operation ultimately depended'.<sup>23</sup> In the case of the Abbottabad station, most of the intercept operations were carried out by 'a very large body of Indian civilian wireless operators'.<sup>24</sup> At the EWSC at Barrackpore (which included 202 Section ISWS), the Indian Signal Corps troops who

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13 Skillen, *Spies of the Airwaves*, p.518; and Skillen, *Knowledge Strengthens the Arm*, pp.428-30.

14 Skillen, *Spies of the Airwaves*, p.519.

15 *ibid.*

16 *ibid.*, pp.519-20.

17 *ibid.*, p.520.

18 Skillen, *Knowledge Strengthens the Arm*, pp.436, 437; and Skillen, *Spies of the Airwaves*, pp.526-9, 535.

19 Skillen, *Knowledge Strengthens the Arm*, p.426.

20 *ibid.*, pp.424, 429.

21 *Radio Warfare*, Technical Staff Monographs 1939-1945, C.B. 03209 (Signal Division, Admiralty, London, 1949), Diagrams 1 and 2.

22 *ibid.*; and 'DF Stations in Operation for Naval Services', Memo from the Secretary of the Admiralty, London, to the Secretary of Naval Office, Melbourne, 1 February 1940.

23 Stripp, *Codebreaker in the Far East*, p.41.

24 *ibid.*, p.50; and Alan Stripp, 'Breaking Japanese Codes' (Mimeo), p.10.

performed the intercept operations were 'Punjabi Mussulman'.<sup>25</sup> At the Imphal station (201 Section ISWS), the intercept operations were done by 'mixed Madrasis', who included Hindus, Muslims and Christians, and operators able to monitor Tamil, Telegu and Malayan languages.<sup>26</sup>

### **Wartime Operations in North-West India (Pakistan)**

As noted above, a SIGINT station was located at Abbottabad before the First World War, to intercept and read Persian, Afghan and Russian signals.<sup>27</sup> In 1930, this station was evidently relocated (as No.1 Wireless Company) to Cherat, where it was principally engaged in intercepting diplomatic traffic in the Far East, sending back the intercepts to GCCS at Broadway in London for cryptanalysis.<sup>28</sup> (GCCS moved from London to Bletchley Park in 1939.) By 1939, the operation had moved back to Abbottabad; and it now involved 'nearly 200 Royal Signals personnel and an Intelligence Section ..., [who] were intercepting Russian and Japanese and other diplomatic ciphers and in 1940 were concentrating on the Red Army in the southern USSR'.<sup>29</sup> At this time, No.1 Wireless Company came directly under the control of GHQ India in Delhi.<sup>30</sup>

During the Second World War, the Abbottabad station operated as the Wireless Experimental Depot (WED), serving the Advanced Headquarters Allied Land Forces South East Asia (ALFSEA) and the WEC's Eastern Wireless Sub-Centre (EWSC) at Barrackpore. In addition to operating in the chain of DF stations for the EWSC,<sup>31</sup> the station was also used to train SIGINT personnel for the stations at Barrackpore and Tezpur.<sup>32</sup>

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25 Skillen, *Knowledge Strengthens the Arm*, p.440.

26 *ibid.*, p.435.

27 Stripp, *Codebreaker in the Far East*, p.50.

28 Skillen, *Spies of the Airwaves*, p.496.

29 *ibid.*

30 *ibid.*, p.497.

31 *ibid.*, p.520.

32 *ibid.*, pp.517, 519.



## 8 *Signals Intelligence (SIGINT) in South Asia*

Also in Pakistan during the Second World War were an intercept and DF station at Quetta,<sup>33</sup> and a Royal Navy DF station at Karachi.<sup>34</sup>

In 1945-46, the WED station at Abbottabad was used to intercept and decrypt Persian and Afghan signals. By this time, Abbottabad had declined to a 'small' operation, with less than a dozen signals and intelligence officers, and a small group of British sergeants and other ranks, but still 'a very large body of Indian civilian wireless operators [who] carried out the detailed intercepting'.<sup>35</sup>

### Wartime SIGINT Operations in Ceylon

There were four important sites of SIGINT operations in Ceylon during the Second World War. The first was at Peradeniya, near Kandy, in south-central Ceylon, which directly serviced Lord Louis Mountbatten's South East Asia Command. The SIGINT station at Peradeniya operated as a joint or Allied activity, with close links with Central Bureau in Brisbane and the WEC in New Delhi.<sup>36</sup>

The second was at HMS *Anderson*, on the southeast outskirts of Colombo. This station was primarily concerned with Japanese naval signals, and served as an outstation of the Japanese Naval Section of the GCCS at Bletchley Park.<sup>37</sup> It also served as a DF station for the Royal Navy.<sup>38</sup>

The third station was at Powder Island, just southwest of Trincomalee, on the northeast coast of Ceylon. It was equipped with both HF and MF DF facilities.<sup>39</sup> The fourth site was at Hambantota, which served as a DF station.<sup>40</sup>

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33 Skillen, *Spies of the Airwaves*, p.517 and map inside back cover.

34 *Radio Warfare*, Diagrams 1 and 2.

35 Stripp, *Codebreaker in the Far East*, p.50.

36 Ballard, *On Ultra Active Service*, pp.298-301.

37 Hugh Denham, 'Bedford-Bletchley-Kilindini-Colombo' in Hinsley and Stripp (eds), *Codebreakers*, pp.272-6.

38 *Radio Warfare*, Diagrams 1 and 2.

39 *ibid.*, Diagram 1; and 'DF Stations Building or Projected', Memo from the Secretary of the Admiralty, London, to the Secretary of Naval Office, Melbourne, 1 February 1940.

40 *Radio Warfare*, Diagram 2.

## Post-Independence Activities

It is reasonable to assume that after the achievement of independence in 1947, the Indian government and the defence force moved fairly quickly to establish indigenous SIGINT capabilities and operations. Several thousand Indian Army and civilian personnel must have been involved in British SIGINT operations during the Second World War - at the WEC in New Delhi and at Abbottabad, Barrackpore, Imphal and numerous other stations. Although these personnel primarily served as intercept operators, they also had extensive administrative responsibilities as well as field experience (in the Burma theatre). Many continued to work at British SIGINT stations in the immediate postwar period (such as the 'very large body of Indian civilian wireless operators' at Abbottabad in 1945-46).<sup>41</sup>

Just two months after India and Pakistan achieved independence they were at war over Kashmir. During this first India-Pakistan war (October 1947-December 1948), the Indian Army conducted extensive tactical COMINT operations. For example, on 8 January 1948, an intercepted Pakistani radio signal disclosed that an Indian tank attack against a major Pakistani base at Asar-Kadala had destroyed the base (and inflicted over 300 casualties, killed and wounded, in the attack).<sup>42</sup> On 12 April 1948, when Indian forces attacked and captured the town of Rajauri, 'intercepted Pak wireless messages' disclosed that the Pakistanis were completely surprised and had decided to quickly escape from the town.<sup>43</sup>

In the second India-Pakistan war, in August-September 1965, the Indian Army COMINT units maintained a fairly comprehensive monitoring of Pakistani radio nets, and were instrumental in some of the decisive operations in the war. For example, on 10 September 1965, during the critical battle at Khem Karan, Indian COMINT units in 4 Mountain Division monitored the radio conversations between the Pakistani Divisional Commander (GOC) and his brigade- and regiment-level subordinates. The record of the intercepted conversations indicates the desperation of the Pakistani commanders:

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41 Stripp, *Codebreaker in the Far East*, p.50.

42 Lt Col (Retd) Bhupinder Singh, *Indo-Pak Conflicts over Kashmir* (B.C. Publishers, Patiala, Punjab, 1983), p.67.

43 *ibid.*, p.77.

## 10 Signals Intelligence (SIGINT) in South Asia

1400 hours

*Divisional Commander:*

Imam Baz [Major General Nasir Ahmad Khan] speaking here. Come and see me immediately.

*Brigade Commander:*

Where do I come to? I do not know.

*Divisional Commander:*

Move straight on and turn right.

*Brigade Commander:*

Do you know where I am? If I turn left, the Indians get me; if I turn right, their artillery gets me. Where do I come to and how?

*Divisional Commander:*

Turn right till you hit the road. Follow it and you will find me at mile 36.

1600 hours

Hello 31 for 10B. Tell Imam 6 that Imam Baz is proud of what he has achieved today and would like to tell him that this was the finest hour for Pakistan. He must hold on to this stronghold of Indians under all circumstances. Reinforcements, however, have been requested for, for which Imam 6 should come back on the main road and do the needful.

1800 hours

29A for Imam Baz. It is not possible to advance any further due to stiff resistance. Heavy enemy shelling has completely pinned us down.

*Divisional Commander:*

It is most important that the advance is continued. Therefore, in the name of Islam, Pakistan and the Hilal-e-Jurat I command you to get up to go forward.

*Brigade Commander:*

I will try my best. As things are I do not know how the hell I'm going to do that. The bloody enemy



artillery are knocking hell out of us and I am afraid at the moment I cannot do anything better than this.<sup>44</sup>

On the basis of the information gleaned from the intercepts that the Divisional GOC was at milestone 36 on the Bhikhiwind road, Indian armoured troops successfully ambushed the Pakistani force, all of whom (including the GOC) were killed.<sup>45</sup> On 11 September, during the battle at Phillorah, intercepts informed the Indian commanders of Pakistani losses, and it quickly became evident to them that they had achieved a decisive victory and set a major turning-point in the war.<sup>46</sup>

In the third India-Pakistan war, in December 1971, which led to the break-up of Pakistan as formed in 1947 and the establishment of Bangladesh, SIGINT was sometimes very important with respect to both informing the planning and supporting the conduct of Indian military operations. On 3 June, six months before the start of the war, SIGINT alerted the Indian authorities to the imminent 'crackdown' against the top leaders of the Awami League by Pakistani forces; the intercept of a transmission from East to West Pakistan that night to the effect that '... the bird has been caged' informed them that Sheik Mujibur Rehman, leader of the Awami League and later the first President of Bangladesh, had been caught by the Pakistanis.<sup>47</sup> In West Pakistan, once the war started, 'information obtained through radio intercepts' provided order-of-battle intelligence on Pakistani forces deploying along the border, although there was little depth to this intelligence.<sup>48</sup> In East Pakistan (Bangladesh), SIGINT was involved in several notable actions. For example, in early December, 'radio intercepts that the Pakistanis were pulling out' formed the basis of the Indian move to capture the town of Sylhet on 7-14 December.<sup>49</sup> SIGINT contributed the 'final blow': on the morning of 14 December, a 'radio intercept' informed the Indian authorities that a high-level Pakistani meeting was to take place at Government House in Dacca at

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44 Cited in Major K.C. Praval, *Indian Army after Independence* (Lancer International, New Delhi, 1990), p.283. See also Lt Col (Retd) Bhupinder Singh, *1965 War: Role of Tanks in India-Pakistan War* (B.C. Publishers, Patiala, Punjab, 1982), pp.136-7.

45 *ibid.*

46 *ibid.*, p.201.

47 Asoka Raina, *Inside RAW: The Story of India's Secret Service* (Vikas Publishing House, New Delhi, 1981), p.54.

48 General K.V. Krishna Rao, *Prepare or Perish: A Study of National Security* (Lancer Publishers, New Delhi, 1991), p.248.

49 Praval, *Indian Army after Independence*, p.342.

## 12 *Signals Intelligence (SIGINT) in South Asia*

noon; while the meeting was in progress it was attacked by Indian aircraft, as a result of which the Governor, his cabinet and his senior civil servants (including West Pakistanis) withdrew from the fray.<sup>50</sup> Early on the morning of 16 December, Indian SIGINT units intercepted the signal from Lt Gen A.A.K. Niazi, GOC Pakistani Eastern Command, to his subordinate commanders directing them to cease fire.<sup>51</sup>

### US-Indian Cooperation

Cooperation with the United States with respect to some specific but very important SIGINT activities was established in the early 1960s, after the war with China in October-November 1962. In 1962-63 the CIA funded the construction of a base at Charbatia, near Cuttack in Orissa, which it used for airborne intelligence (PHOTINT and SIGINT) operations against China. Charbatia was originally a joint operation by the CIA and the Indian Intelligence Bureau (IB), but by the end of the 1960s it was maintained by the recently established Aviation Research Centre (ARC) of the Research and Analysis Wing (RAW) of the Cabinet Secretariat.<sup>52</sup> In early 1964, India agreed to a US proposal to install, in the Himalayas, remotely operated telemetry intelligence (TELINT) devices for 'securing information about [Chinese] missile developments'.<sup>53</sup> The first of these was installed near the summit of Nanda Devi in 1965, but was swept away in an avalanche; the second operated on the summit of neighbouring Nanda Kot in 1967-68.<sup>54</sup> This was very much a joint US-Indian project. It had the personal sanction, from 1964 to 1968, of three Prime Ministers - Jawaharlal Nehru, Lal Bahadur Shastri and Indira Gandhi. As Prime Minister Morarji Desai told the Lok Sabha on 17 April 1978, the expeditions to install the devices were 'carried out predominantly by Indian personnel but under joint auspices and were in the know of and

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50 Raina, *Inside RAW*, pp.60-1; and Praval, *Indian Army after Independence*, p.357.

51 Rao, *Prepare or Perish*, p.196.

52 Inderjit Badhwar, 'Central Intelligence Agency: The Indian Connection', *India Today*, 31 December 1983, pp.10-11; Shekhar Gupta, 'Charbatia: Secret Base', *India Today*, 31 December 1983, pp.10-11; and Manoj Joshi, 'Signal Wars: Indian Capability in Perspective', *Frontline*, 10 September 1983, p.77.

53 Prime Minister Morarji Desai, *Lok Sabha Debates*, Sixth Series, No.38, 17 April 1978, p.307.

54 *ibid.*, pp.306-29. See also Badhwar, 'Central Intelligence Agency', p.10; and Joshi, 'Signal Wars', p.77.

with the approval of the highest political level of the Government of India at that time'.<sup>55</sup> Information obtained from this system was reportedly 'shared by the Americans and Indians'.<sup>56</sup>

In 1969, the United States established a large SIGINT station in north India, which replaced the US station at Peshawar in Pakistan, which the Pakistan government forced the United States to close in July 1969. (Some of the equipment for the station came from Peshawar.) The station was designed to monitor both Soviet missile and space activities in southern USSR and Chinese nuclear and missile activities in Sinkiang Province. It could also monitor activities in Pakistan.<sup>57</sup>

In sum, over the quarter of a century from the 1930s through the 1960s, Indians had been involved in SIGINT operations, first with British and then with US authorities, against Russia and the USSR, Japan, Afghanistan, Iran, Pakistan, China, Burma and 'the Malaya and Sumatra areas'. It was an extraordinary purview for a Third World, non-aligned country!

### The 1970 ITU Report

In 1970, an official Indian report to the International Telecommunication Union (ITU) in Geneva on 'Direction Finding at Monitoring Stations' described 'the experiences [through the mid-1960s] of the Indian Administration in use of HF direction finding equipment for monitoring'.<sup>58</sup> The full text of the report is as follows:

Direction-finding equipment with 8-element Adcock antennae, rotating goniometer and automatic visual indicator is being used at the monitoring stations of the Indian Administration. By the use of a suitable pre-amplifier after the goniometer at

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55 Prime Minister Morarji Desai, *Lok Sabha Debates* (Sixth Series, No.38), 17 April 1978, pp.307-8.

56 Badhwar, 'Central Intelligence Agency', p.10.

57 See William J. Coughlin, 'U.S. Spy Base in India Eyes China Atom, Missile Activities: Shifted From Pakistan in 1969', *International Herald Tribune*, 26-27 June 1971, p.5.

58 'Direction Finding at Monitoring Stations' (Report 372/1, International Radio Consultative Committee, XII Plenary Assembly, New Delhi, 1970) in *Spectrum Utilisation and Monitoring* (International Telecommunication Union, Geneva, 1970), Vol.1, pp.371-3; and information provided by the Head of Archives Service, International Telecommunication Union, Geneva, 13 March 1993.



## 14 *Signals Intelligence (SIGINT) in South Asia*

the centre of the antenna system and using simple remote control technique, it is possible to locate the antenna system at a distance of 300 m from the main reception/indicator equipment.

For the type of direction-finding equipment indicated, it is possible to have the remote control facility at a moderate extra cost. The availability of the direction-finding equipment alongside other monitoring equipment has proved to be most convenient in the monitoring work. The same operator who is working on a monitoring channel can quickly take bearings of any station he desires. Selection of site with respect to the main monitoring building does not become very critical, as the antennae can be located up to a distance of 300 m from the main building. The effect of other antennae in the field also can be thus reduced.

The commercial direction-finding equipment has been modified to use a monitoring receiver which has better frequency stability (calibration at every 1 kHz interval right up to the highest frequency of 30 MHz). This again provides a great facility in tuning quickly and correctly the wanted station for the direction-finding bearing.

The above direction-finding system provides the bearing accuracy between  $\pm 1^\circ$  for stable signals exceeding  $50 \mu\text{V/m}$  and  $\pm 2^\circ$  for stable signals exceeding  $3 \mu\text{V/m}$ . Considering that, in the HF spectrum, the bearing inaccuracies contributed by fading and instability of the signals and other factors could be of this order, it is felt that the basic accuracy of the equipment as mentioned above should be adequate for monitoring purposes.

The direction-finding system employing a rotating goniometer has certain disadvantages as compared with one using phase/amplitude balanced amplifiers etc. With the rotating goniometer type, bearings are difficult to take in the presence of interference. Separate calibrations are required when selectivity of the receiver is changed and it is not always possible to choose the optimum selectivity to avoid interference. Most systems can, therefore, offer either one or two selectivities such as 1.2 kHz or 3 kHz. Proper adjustments

of tuning, gain control, settings, etc., are required for taking good bearings. However, usually trained operators are employed at monitoring stations, hence these drawbacks can be overcome to some extent. This type of direction-finding equipment is fairly cheap.

It is the experience of the Indian Administration that operational personnel for taking bearings in the HF bands require considerable training. This involves training in proper adjustments of various controls as also training in taking bearings especially when the signals are fading or the bearings are swinging. Untrained operators tend to read bearings with certain bias towards one particular value, thus tending to give a false indication of class of bearings.<sup>59</sup>

It is evident from this report that by the 1960s, India's signal monitoring and DF capabilities were quite sophisticated. Although the principal reported monitoring/DF system was the relatively simple 8-element Adcock system, it is clear that Indian operators had a good appreciation of the technical and operational state-of-the-art and that the principal Indian problem was the training requirements for the operators.

### **Soviet SIGINT Activities in India**

In 1971, during the third India-Pakistan war, the Soviet Union provided the Indian Air Force with a Tu-126 *Moss* airborne warning and control system (AWACS) aircraft and crew.<sup>60</sup> In addition to its primary air surveillance radar system (*Flat Jack*), the *Moss* was equipped with ELINT and ESM systems for monitoring and electronic warfare (EW) operations against the Pakistan Air Force.

In the early 1970s, the Soviet Union established two SIGINT stations in Punjab. One station, operated by some 300 Soviet Air Force personnel, is at Ludhiana; and the other, with some 200 personnel, is at Bhatinda. These stations are well-placed to provide SIGINT coverage of northern Pakistan and southwest China.

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<sup>59</sup> 'Direction Finding at Monitoring Stations', pp.372-3.

<sup>60</sup> Bill Sweetman and Bill Gunston, *Soviet Air Power* (Salamander Books, London, 1978), p.177.

### **The Indian SIGINT Establishment**

The Indian SIGINT establishment consists of a dozen organisations involved with SIGINT collection activities of one sort or another, together with several committees and boards for management and coordination of these organisations and their activities.

SIGINT of all sorts is collected. There are organisations concerned with the collection, processing and analysis of diplomatic communications; others are concerned with foreign military signals, from the strategic through the operational to the tactical levels; both the Indian Air Force and Navy conduct maritime surveillance by ELINT means; there are organisations that monitor satellite communications, both for SIGINT and political censorship purposes; others specialise in telemetry intelligence (TELINT); there are organisations involved in SIGINT for border security, counter-intelligence, counter-espionage, counter-terrorist and domestic political surveillance purposes; and there are organisations concerned with communications security (COMSEC) and monitoring the radio waves for the purposes of frequency spectrum management. There is, in practice, a loose delineation of functional responsibilities between the plethora of organisations involved. There is considerable overlap and duplication of effort. The structure of Indian SIGINT activity is less coherent than a summary review of the various organisations and their principal responsibilities might suggest.

#### *(i) The Signals Intelligence Directorate of the Military Intelligence Directorate of the Army*

The Signals Intelligence Directorate (SID) of the Military Intelligence Directorate of the Indian Army is India's largest SIGINT organisation, and is reportedly 'involved in some 40 per cent of India's Sigint activity'.<sup>61</sup> It is a tri-service organisation, with its headquarters occupying the three upper floors of Sena Bhavan in New Delhi.<sup>62</sup> The

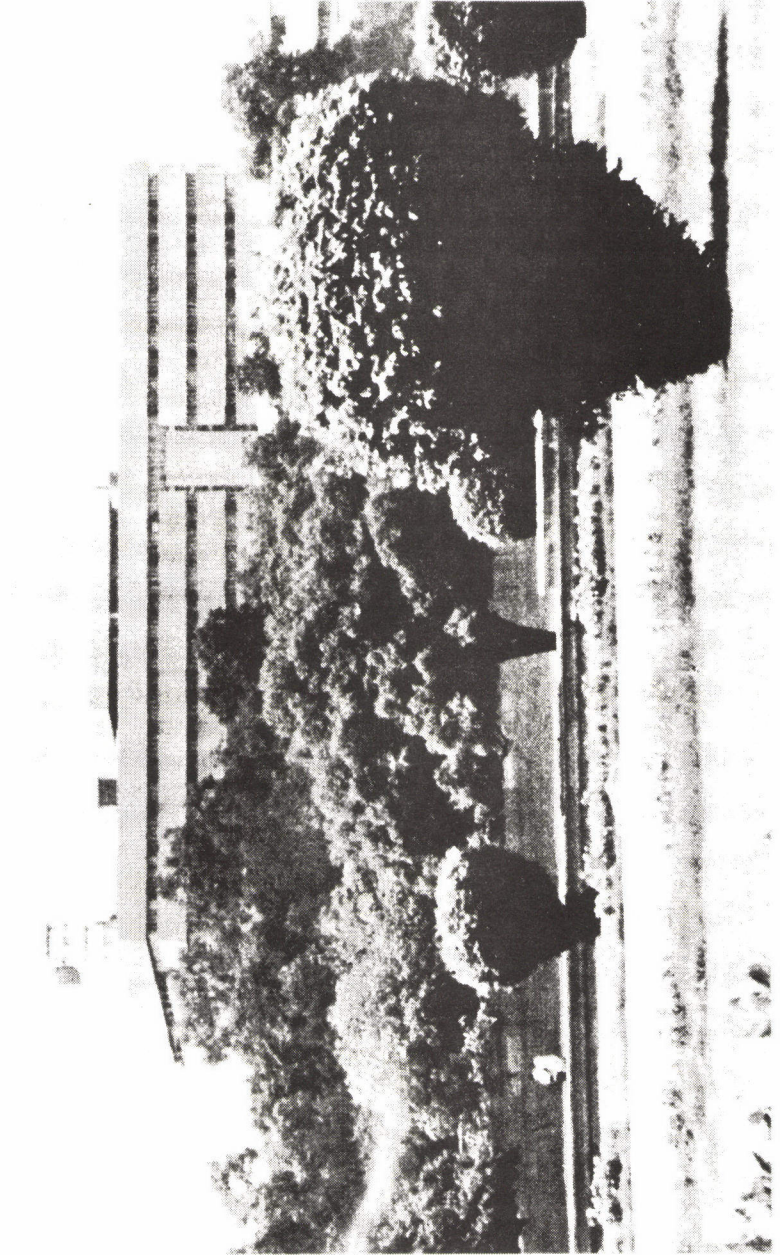
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<sup>61</sup> Joshi, 'Signal Wars', p.76.

<sup>62</sup> *ibid.*, pp.75-6.



**Figure 1.2: Sena Bhavan, Delhi, Headquarters of the Indian Signals Intelligence Directorate**



## 18 *Signals Intelligence (SIGINT) in South Asia*

SID is administratively responsible for the Central Monitoring Organisation (CMO), which maintains and operates the SIGINT stations. These stations are located across India, and monitor Pakistani, Chinese, Bangladeshi and Burmese radio traffic. Its most extensive network is located along the Pakistan border.<sup>63</sup>

The SID/CMO has responsibilities at both the military operational level and, largely for historical reasons, the national strategic level. In the former role, it not only collects military ELINT and COMINT at its own stations, but also coordinates the SIGINT activities of the Army Commands.<sup>64</sup>

At the national level, CMO's No.5 Company operates a station on the Delhi ridge, behind Dhuala Kuan, which monitors foreign diplomatic traffic.<sup>65</sup>

The CMO also has a responsibility for communications security (COMSEC). However, according to Major General (Retd) Yashwant Deva, former Chief Signal Officer, Southern Command:

[The CMO] is tasked to check breaches of security on the radio, [but it] is structurally weak and functionally ineffective. It only monitors the known frequencies from fixed stations over a limited spectral segment.<sup>66</sup>

For many years, the SID was responsible for airborne SIGINT patrol along the Pakistan border, which involved the daily flight of an *Avro* HS 748 aircraft from Kargil to Gujarat. However, it has been reported that all airborne SIGINT operations have been transferred to RAW/ARC, and the Directorate is now responsible for ground-based SIGINT operations only.<sup>67</sup>

### (ii) *The Research and Analysis Wing (RAW)*

National and strategic SIGINT was taken over by the Research and Analysis Wing (RAW) of the Cabinet Secretariat when it was formed in 1968. Within RAW, responsibility for SIGINT operations

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63 *ibid.*, pp.76-7.

64 *ibid.*, p.76.

65 *ibid.*

66 Yashwant Deva, 'Communication Issues: Of Pawan and the Assassination', *Frontline*, 28 February 1992, p.80.

67 Joshi, 'Signal Wars', p.77.

lies with the Electronic Technical Section (ETS), which maintains ground stations for monitoring the encrypted diplomatic and military communications of neighbouring countries, and the Aviation Research Centre (ARC), which conducts airborne SIGINT operations. These two sections account for a large proportion of RAW's budget.<sup>68</sup> RAW (including the ARC) reportedly accounts for some 30 per cent of India's SIGINT activity.<sup>69</sup>

The headquarters of the RAW is in Lodi Road, with the RAW telecommunications headquarters at Patparganj.<sup>70</sup> RAW maintains a large SIGINT station in south Delhi,<sup>71</sup> and numerous stations throughout the rest of India, monitoring signals from Pakistan, Afghanistan, China, Sri Lanka, Bangladesh, Burma, etc. It also 'has a monitoring set-up along the Pakistan border, but it is not as extensive as that of the MIs [SID/CMO]'.<sup>72</sup>

The RAW maintains a number of stations for satellite communications (SATCOM) SIGINT, one site of which is reckoned to be Sikandarabad across the Yamuna from Delhi.<sup>73</sup> It is also likely that RAW conducts SIGINT activities from the Indian Embassy compounds in Islamabad and Beijing.<sup>74</sup>

In mid-1990, the role of the RAW within the Indian intelligence community was strengthened, and its collection activities were refocused, with increasing attention concentrated on economic and industrial intelligence.<sup>75</sup>

### (iii) *The Aviation Research Centre (ARC)*

The Aviation Research Centre (ARC), which was established in 1963, is responsible for airborne SIGINT operations. (The first Director of the ARC was Rameshwar Nath Kao, a Kashmiri Brahmin, who later served as Director of RAW from its establishment in 1968

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68 Raina, *Inside RAW*, pp.45-6.

69 Joshi, 'Signal Wars', p.77.

70 'RAW Staff Refute Claim by Officials', *Times of India*, 7 December 1980, p.3.

71 Joshi, 'Signal Wars', p.77.

72 *ibid.*

73 *ibid.*

74 *ibid.*

75 'Intelligence: The Making or Breaking of India's Singh Administration?', *Defense & Foreign Affairs*, Vol.18, No.8, August 1990, p.25.



## 20 Signals Intelligence (SIGINT) in South Asia

until 1977.)<sup>76</sup> The ARC was established in the immediate aftermath of the border war with China in October-November 1962, and has remained chiefly concerned with airborne intelligence operations (both PHOTINT and SIGINT) against China. Advanced signals monitoring equipment has been produced indigenously by the ARC (Technical) Services Branch. The ARC maintains specially configured aircraft for SIGINT operations - including two Boeing 707s, two Learjet 29As, three Gulfstream IV SRAs, *Canberras*, Antonov An-12 *Cub Bs*, Antonov An-32 *Sutlejs* and Ilyushin Il-76 *Gajrajs*.<sup>77</sup>

The ARC maintains two major air bases and associated processing facilities. The first is at Charbatia (known as Establishment 22), on the outskirts of Cuttack in Orissa; the base was originally established by the CIA in 1962-63 to support airborne SIGINT and photographic reconnaissance operations across Tibet, but it is also well placed for operations against India's northeastern and eastern neighbours.<sup>78</sup> The second is at Sarsawa, near Saharanpur in Uttar Pradesh,<sup>79</sup> which provides airborne coverage of the western sector of the India-China border, as well as of northeast Pakistan.

The ARC is reportedly now also responsible for the daily patrol by HS 748 *Avro* SIGINT aircraft along the Pakistan border from Kargil in Kashmir to Gujarat in the south. It is planned to replace the HS 748s with Boeing 737s for this purpose.<sup>80</sup>

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76 Dilip Bobb and Shekhar Gupta, 'Intelligence Agencies: The Spy Trade', *India Today*, 31 December 1983, p.17.

77 Dilip Bobb, 'Spying or Crying?', *India Today*, 16-31 August 1980, p.39; and Dilip Bobb, 'Blunting the Edge', *India Today*, 1-15 December 1980, p.85; S. Srinivasan, 'Intelligence Plane Crashed in Orissa', *Telegraph* (Calcutta), 11 March 1988, p.1; Manoj Joshi, 'Next-Door Diplomacy: India and Emerging Imperatives', *Frontline*, 3 July 1992, p.36; Prasun Sengupta, 'China Expands Air Forces: Implications for Asia-Pacific Balance of Military Power', *Military Technology*, August 1992, p.55; and Joshi, 'Signal Wars', p.77.

78 Bobb, 'Blunting the Edge', p.85; Bobb and Gupta, 'Intelligence Agencies', p.17; and Gupta, 'Charbatia', pp.10-11.

79 Joshi, 'Signal Wars', p.77.

80 *ibid.*

Figure 1:3: Indian Airborne SIGINT: Main Operating Bases



## 22 *Signals Intelligence (SIGINT) in South Asia*

### (iv) *The Intelligence Bureau (IB)*

The Intelligence Bureau (IB) of the Ministry of Home Affairs is India's largest intelligence organisation, and is responsible for counter-espionage, counter-subversion and domestic political intelligence operations. The IB and its Subsidiary Intelligence Bureaux (at, for example, Shillong and Calcutta) maintain SIGINT stations for monitoring clandestine transmissions. There is, for example, a major IB station south of Delhi. The IB reportedly accounts for some 15 per cent of Indian SIGINT activity.<sup>81</sup>

### (v) *The Border Security Force (BSF)*

The Border Security Force (BSF) of the Ministry of Home Affairs is a quasi-military organisation responsible for security intelligence activities in particular border areas, and most particularly along the Pakistan border and in the southern areas of India across from Sri Lanka.<sup>82</sup>

The BSF reportedly accounts for some 20 per cent of Indian SIGINT activity.<sup>83</sup>

### (vi) *The Indian Defence Research and Development Organisation (DRDO)*

The Indian Defence Research and Development Organisation (DRDO) is currently constructing three SIGINT stations to collect Chinese telemetry intelligence (TELINT) associated with ballistic missile and other advanced weapons tests. These stations are located near Almora, on Sitoli Ridge on the northern side of Naini Tal in the Himalayas; at Bareilly, some 150 km south of Almora; and near Darjeeling in the north-east (and just 400 km south-west of Lhasa in Tibet).<sup>84</sup> (The Almora/Naini Tal site is only 100 km south of Nanda Devi and Nanda Kot, where the CIA maintained facilities for collecting TELINT from Chinese missile tests and nuclear weapons tests in 1965-68.)<sup>85</sup>

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81 *ibid.*

82 *ibid.*; and Yashwant Deva, 'Communication Issues', pp.78,80.

83 Joshi, 'Signal Wars', p.77.

84 Manoj Joshi, 'Snooping in Style', *Frontline*, 10 September 1993, p.80.

85 Badhwar, 'Central Intelligence Agency', p.10.



The DRDO presumably has the management and operational responsibility for these TELINT stations because of its generally acknowledged expertise in missile and advanced weapons development as well as its experience in the design and operation of advanced telemetry equipment in its own test programmes.

(vii) *The Indian Air Force (IAF)*

The Indian Air Force (IAF) maintains an extensive array of airborne SIGINT/ELINT/EW capabilities - from strategic SIGINT collection systems to individual unit electronic self-protection devices.

With respect to strategic SIGINT collection, the air force cooperates closely with the ARC. For example, the airborne systems operated by the ARC - the Boeing 707s, *Canberras*, Learjets, Gulfstreams, An-12 *Cub* Bs, An-32s and Il-76s - fly with IAF colours and are generally crewed by IAF officers on deputation to the ARC. (For example, the ARCs An-12 *Cub* B which crashed at Cuttack (Charbatia) in March 1988 had three IAF flying crew and six ARC 'technicians'.)<sup>86</sup>

In addition to the score of its aircraft used by the ARC, the IAF has several other types of aircraft which it uses for strategic and operational SIGINT/EW activities. An EW squadron (No.35) operates specially equipped *Canberra* aircraft;<sup>87</sup> it also has four HS-748 EW aircraft. The IAF also has a reconnaissance squadron equipped with six MiG-25R (*Foxbat* B) aircraft, which are primarily utilised for PHOTINT missions but which do have some secondary ELINT capabilities.

(viii) *The Indian Navy*

The Indian Navy maintains a wide range of airborne, surface and submarine ELINT and ESM collection capabilities - including Soviet/Russian, US, British, West German, Italian and indigenously designed systems.

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<sup>86</sup> Srinivasan, 'Intelligence Plane Crashed in Orissa', p.1.

<sup>87</sup> John W.R. Taylor and Kenneth Munson, 'Gallery of Asian and Pacific Airpower', *Air Force Magazine*, November 1990, p.81.

## 24 Signals Intelligence (SIGINT) in South Asia

The navy operates more than 20 maritime patrol aircraft, equipped with a variety of ELINT and ESM systems. These include some eleven Dornier Do-228s, operated by No.750 Squadron at Daman, north of Bombay;<sup>88</sup> eight Tu-142M *Bear* Fs, the first of which were delivered by the Soviet Union in April 1988, and initially operated by No.312 Squadron at Dabolim in Goa,<sup>89</sup> but recently moved to a newly opened base at Arakkonam, near Madras; and five Il-38 *Mays* operated by No.315 Squadron at Dabolim.<sup>90</sup>

The Indian Navy also operates some 30 *Sea King* Mark 42B ASW helicopters, which are equipped with the *Hermes* ESM suite acquired from the United Kingdom in the late 1980s.<sup>91</sup>

The navy's submarines and major surface combatants are also well equipped with ELINT/ESM systems. For example, the eight *Sindhughosh* (*Kilo*)-class submarines acquired from the Soviet Union in 1986-89 are equipped with a HF/VHF intercept array, a *Quad Loop* DF system, and a *Squid Head* (a successor to the *Stop Light*) ESM system.<sup>92</sup> The three *Shishumar* (West German 209/1500)-class submarines, commissioned in 1986-91, are equipped with the *Phoenix II* ESM system produced by ARGO Systems Inc. in Sunnyvale, California, which provides automatic identification and bearing of intercepted radar emissions in the frequency range of 2-18 GHz.<sup>93</sup>

The five *Rajput* (Soviet *Kashin*)-class destroyers are equipped with two *Watch Dog* ELINT/ESM systems.<sup>94</sup> The three *Godavari*-class frigates are equipped with the Italian Selenia INS-3 ESM system, which covers the 1-18 GHz band; its RQN-3 sub-system provides automatic detection, analysis and DF/tracking of radar emitters operating in this

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88 John W.R. Taylor (ed.), *Jane's All the World's Aircraft, 1986-87* (Jane's Publishing Company, London, 1986), p.87.

89 Adam Kelliher, 'India Gets Soviet "Eyes"', *Australian*, 11 April 1988, p.1.

90 Taylor (ed.), *Jane's All the World's Aircraft, 1986-87*, p.232.

91 Defense Marketing Service (DMS), 'Hermes', *DMS Market Intelligence Report* (DMS Inc., Greenwich, Connecticut, August 1988).

92 'Indian "Kilo" Submarine Underway', *Jane's Soviet Intelligence Review*, Vol.1, No.1, January 1989, p.5; and John Jordan, *Soviet Submarines: 1945 to the Present* (Arms and Armour Press, London, 1989), pp.177-8.

93 Captain Richard Sharpe RN (ed.), *Jane's Fighting Ships, 1991-92* (Jane's Information Group, Coulsdon, Surrey, 1991), p.260; and Bernard Blake (ed.), *Jane's Radar and Electronic Warfare Systems, 1990-91* (Jane's Information Group, Coulsdon, Surrey, 2nd edn 1990), p.394.

94 Sharpe (ed.), *Jane's Fighting Ships, 1991-92*, p.263.

band.<sup>95</sup> The six *Nilgiri* (British *Leander*)-class frigates are equipped with Racal UA 8/9 radar intercept systems and Telefunken *Telegon* FH5 DF systems.<sup>96</sup> The three *Talwar* (British *Whitby*) and *Beas* (British *Leopard*)-class frigates carry the Telefunken *Telegon* IV DF systems.<sup>97</sup> And the new *Khukri*-class corvettes, of which some 16 are being built in Bombay and Calcutta, are equipped with *Ajanta P* radar intercept systems produced by Bharat Electronics Ltd in Bangalore.<sup>98</sup>

In 1990, during *Desert Shield*, an Indian submarine reportedly tracked the Australian naval contingent on its way to join the US-led forces in the Persian Gulf, attempting 'to gather information on its communications and radar equipment'.<sup>99</sup>

#### (ix) *The Indian Army*

The Indian Army maintains a very extensive SIGINT and EW capability, at strategic, operational and tactical levels. Army SIGINT units operate through a dual structure for both tasking and reporting purposes, with the activity coordinated at the Army Command level. (There are five geographical Commands - Northern, Southern, Eastern, Western and Central.) On the one hand, they operate as collection stations for the Signals Intelligence Directorate of the Military Intelligence Directorate; this is particularly the case with respect to SIGINT operations at the Corps level. On the other hand, they also function as integral SIGINT and EW elements of military formations, as well as supporting special military deployments - such as in Kashmir, or with the Indian Peace-Keeping Force (IPKF) in Sri Lanka.<sup>100</sup>

The bulk of the army's SIGINT equipment at the tactical level was acquired from the Soviet Union in the 1970s. This includes both fixed HF and VHF DF systems and highly specialised truck-mounted DF and monitoring equipment.<sup>101</sup> Some equipment is indigenously

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95 *ibid.*, p.264; and *The International Countermeasures Handbook* (Cardiff Publishing, Englewood, Colorado, 15th edn 1990), pp.98,108.

96 Sharpe (ed.), *Jane's Fighting Ships, 1991-92*, p.265.

97 *ibid.*, p.266.

98 *ibid.*, p.267.

99 Karen Middleton, 'India, Iran Spied on Australian Ships Going to Gulf', *Telegraph Mirror* (Sydney), 14 October 1994, p.27.

100 Joshi, 'Signal Wars', pp.76,78; and Deva, 'Communication Issues', pp.78-80.

101 Joshi, 'Signal Wars', p.76.



## 26 *Signals Intelligence (SIGINT) in South Asia*

designed and produced, such as HF DF systems designed by the Defence Electronic Research Laboratory (DERL) in Hyderabad.<sup>102</sup>

In 1987, the Electronics Corporation of India Limited (ECIL) began production under licence of Racal COMINT and EW equipment for the Indian Army and other 'Indian government agencies'.<sup>103</sup> This equipment includes the Racal RA 1792 LF/HF radio communications monitoring receiver for surveillance of the 100 kHz to 30 MHz frequency band, and the Racal RA 1795 VHF/UHF radio communications receiver for monitoring the 20 to 1,000 MHz band.<sup>104</sup> Since 1990, India has also been importing large quantities of electronic warfare and 'passive intelligence' equipment from the United States. In 1990-91, these imports reportedly amounted to some US\$400 million.<sup>105</sup> According to one account, India realised during the Gulf War not only that EW was a powerful 'force multiplier', but also that US EW systems were quite superior to the Soviet-designed equipment which it acquired during the 1970s and 1980s.<sup>106</sup>

### (x) *SATCOM SIGINT*

In addition to the RAW stations for collecting SATCOM SIGINT, a station has been constructed at Jalna, in Maharashtra state, some 300 km north-east of Bombay, 'to monitor and possibly screen out foreign [satellite television] broadcasts'.<sup>107</sup> According to a Government study completed in February 1991, uncontrolled access to international satellite television networks would 'expose a large section of the population to information predominated by foreign perceptions

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102 *ibid.*

103 'RA 1795 VHF/UHF Receiver' in John Williamson (ed.), *Jane's Military Communications, 1990-91* (Jane's Information Group, Coulsdon, Surrey, 11th edn 1990), p.596.

104 See 'RA 1792 Receiver' and 'RA 1795 Receiver' in Blake (ed.), *Jane's Radar and Electronic Warfare Systems, 1990-91*, p.325.

105 Pravin Sawhney, 'India to Get US Electronic Warfare Aids', *Sunday Times* (New Delhi), 3 November 1991, p.1; and *Asia-Pacific Defence Reporter*, November 1991, p.38.

106 Sawhney, 'India to Get US Electronic Warfare Aids', p.1.

107 Khalid Mohamed, 'Project to Intercept Satellite Signals', *Sunday Times* (Bombay), 9 June 1991, pp.1,3. See also 'Indian Government Building Earth Station "to Monitor Foreign TV"', *Straits Times*, 6 December 1991, p.8; and Barbara Crosette, 'India Foreign TV Monitor Sights "Alien Influences"', *International Herald Tribune*, 13 June 1991, p.7.

and alien social values'.<sup>108</sup> However, evidently of more concern to the Indian authorities is the prospect 'that violent images of Kashmir, Punjab and caste wars in states like Bihar will be seen "live" in all parts of India itself ... making it more difficult to hide the truth from the people'.<sup>109</sup>

The SATCOM monitoring facility at Jalna involves a 55-foot diameter, 90-tonne dish antenna built by a Madras-based company with the technical cooperation of Bharat Electronics Ltd in Bangalore and the Indian Space Research Organisation (ISRO). The Jalna station began operating at the end of 1991.<sup>110</sup>

*(xi) The All-India Radio Monitoring Service (AIRMS)*

The All-India Radio Monitoring Service (AIRMS), located in Simla, monitors all non-encrypted broadcasts from countries of interest to India, such as those from Pakistan, Afghanistan, Bangladesh, China and Sri Lanka.<sup>111</sup>

The AIRMS has close working relations with the Indian intelligence community, including both the RAW and Military Intelligence. Its archival records of foreign broadcasts are a valuable source of 'raw intelligence'. The AIRMS facilities have also been utilised during military operations (including in radio deception operations).<sup>112</sup>

*(xii) Wireless Planning and Coordination Cell (WPC), Ministry of Communications*

The Wireless Planning and Coordination Cell (WPC) of the Ministry of Communications is responsible for radio monitoring and frequency spectrum management in accordance with obligations to the International Telecommunication Union in Geneva as well as national

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108 'Indian Government Building Earth Station "to Monitor Foreign TV"', *Straits Times*, 6 December 1991, p.8.

109 Madhu Jain and W.P.S. Sidhu, 'Satellite TV: Battle for the Box - Foreign Networks Place Government in a Quandary', *India Today*, 31 March 1992, p.160.

110 Mohamed, 'Project to Intercept Satellite Signals', pp.1,3.

111 Raina, *Inside RAW*, pp.43-5.

112 *ibid.*, pp.43-4.



regulations concerning radio transmission.<sup>113</sup> As with the AIRMS, although the WPC is a civil, public authority, it cooperates with relevant elements of the Indian intelligence community, including the RAW, IB and Military Intelligence as required.

### Assessment

India's involvement in SIGINT activities has a long history, beginning some nine decades ago. Some periods in this history have been quite illustrious, such as the performance of Indian SIGINT personnel during the Second World War. From the achievement of independence in 1947 through the 1950s and 1960s, India developed an extensive though poorly coordinated SIGINT establishment, with a plethora of agencies concerned with the collection of SIGINT - foreign diplomatic and military, strategic and tactical, ground-based and airborne, and internal as well as external. In the 1960s and 1970s it benefited from cooperation with the United States and the Soviet Union in certain SIGINT activities. It has acquired SIGINT equipment from Britain, the United States, the Soviet Union, West Germany and Italy. It has also developed an indigenous capability for the design and production of SIGINT equipment. Its SIGINT establishment is the second largest (after China) in Asia. Some of its SIGINT facilities and operations are extremely sophisticated.

However, the long history, breadth of capabilities and sophistication of some of its facilities and operations notwithstanding, the performance of the Indian SIGINT establishment has been quite mixed. There have been some noteworthy achievements at the tactical level, but performance at the strategic level has been consistently poor.

At the strategic level, the Indian intelligence establishment has manifested a litany of failure. During the first India-Pakistan war, in 1947-48, India essentially lacked any strategic intelligence capabilities whatsoever. The war with China in 1962 was an intelligence débâcle; neither the Intelligence Bureau nor Military Intelligence had any reasonable appreciation of China's deployments and capabilities in the border areas, and they completely misread Chinese intentions, advising the government that China would not respond massively to Indian provocations. The second India-Pakistan war, in August-

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<sup>113</sup> Joshi, 'Signal Wars', p.76.

September 1965, was preceded by a three-month period in which the Pakistan Army recruited, trained and moved into Jammu and Kashmir a force of some 30,000 guerrillas (the 'Gibraltar Forces'), without any anticipation by Indian intelligence agencies of Pakistan's intention to launch a large-scale guerrilla campaign in these two states.<sup>114</sup> In 1971, although India achieved a resounding military victory, 'the higher direction of [the] war suffered from poor intelligence inputs'.<sup>115</sup> When India undertook peacekeeping operations in Sri Lanka in 1987-91 (Operation *Pawan*), the lack of good intelligence 'proved to be a costly affair, particularly in the early stages of the operations'.<sup>116</sup> In the late 1980s, the Indian intelligence establishment completely misjudged the depth and ferocity of opposition to the Union Government in Kashmir.<sup>117</sup> In May-June 1990, it provoked a crisis in India-Pakistan relations by incorrectly reporting a major forward deployment of Pakistani forces to the Indian border and persuading the government to counter with a costly (US\$250 million), unnecessary and inflammatory forward deployment of Indian forces.<sup>118</sup>

The principal response to this litany of failures at the strategic level has been organisational. Following the 1947-48 war with Pakistan, a Foreign Intelligence Desk was established within the Intelligence Bureau (IB), but it also proved inadequate in monitoring the activities of neighbouring countries. The Military Intelligence Directorate was enhanced through the 1950s, but its purview was essentially limited to order-of-battle (ORBAT) studies and assessments of foreign military capabilities. The intelligence débâcle with respect to China in 1962 led directly to the establishment of the Aviation Research Centre (ARC) in 1963. The second war with Pakistan, in 1965, prompted the establishment of the Research and Analysis Wing (RAW) in 1968. In the past two decades, a succession of official reviews and inquiries, consequent upon particular intelligence failures, has led to reorganisations within and between the various intelligence agencies, as well as at the management level of the Indian intelligence establishment. These organisational changes have not produced any noticeable improvement in performance. By and large, they have

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114 Rao, *Prepare or Perish*, p.149; and Praval, *Indian Army after Independence*, pp.250-1.

115 Praval, *Indian Army after Independence*, p.404.

116 Rao, *Prepare or Perish*, p.417.

117 'Intelligence: The Making or Breaking of India's Singh Administration?', p.24.

118 *ibid.*

### 30 *Signals Intelligence (SIGINT) in South Asia*

failed to address the real weaknesses and problems in the establishment. Their principal impact, at least in the short term, has been disruptive.

#### **SIGINT Operations at the Tactical Level**

At the tactical level, the performance of Indian SIGINT units has been fairly good. There have been some noteworthy achievements in the various wars and crises involving Pakistan; in the Indian peacekeeping operations (Operation *Pawan*) in Sri Lanka in 1987-91; and in operations in Kashmir since the late 1980s.

##### **(i) *Pakistan***

SIGINT operations against Pakistan have been 'reasonably effective at the tactical level'.<sup>119</sup> In both the first and second wars with Pakistan (October 1947-December 1948 and August-September 1965), SIGINT was instrumental in some of the decisive Indian victories.<sup>120</sup>

In 1986-87, during the Indian *Brasstacks* exercise, when reciprocal mobilisations and deployments nearly led to a fourth war between India and Pakistan, Indian SIGINT activities were reportedly very successful. According to one report, for example:

Indian Sigint was able to provide real-time information, that is, actual minute-by-minute information, on the movement of Pakistani armoured formations at the time of the *Brasstacks* exercise.<sup>121</sup>

In December 1986, Pakistan moved its regular (No.6) armoured division from its base at Kharian (some 120 km south-east of Islamabad and only 35 km from the Indian border) closer to the border, and in January it moved its Strike Group South, with the reserve (No.1) armoured division from Multan to northern positions; these movements meant that Pakistan's armoured forces were well placed to strike into the Punjab if the Indian exercise turned into a strike into Sind. It may well have been SIGINT concerning these movements and the evident Pakistani intention to counter-strike into

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119 *ibid.*, p.77.

120 Singh, *Indo-Pak Conflicts over Kashmir*, pp.67,77; and Singh, *1965 War*, pp.136-7, 201.

121 Joshi, 'Signal Wars', p.77.



the Punjab that persuaded India to cancel the exercise and disengage from the area. Following this episode, however, the Pakistani armed forces have introduced more sophisticated communications security (COMSEC) systems and procedures which have significantly reduced the vulnerability of their signals to Indian SIGINT activity.<sup>122</sup>

(ii) *Operation Pawan*

SIGINT activities were an important element of the Indian peacekeeping operations (*Operation Pawan*) in Sri Lanka in 1987-91. When the Indian Peace-Keeping Force (IPKF) arrived in Sri Lanka, it found that the Liberation Tigers of Tamil Eelam (LTTE) possessed an extensive array of communications systems, much of which was vulnerable to exploitation. High-powered HF transmitters located at remote places along the eastern coastline were used for trunk communications. The LTTE's logistical and communication nodes were linked to support bases in Tamil Nadu in southern India by FM radio. Citizens' band (CB) radios and walkie-talkies were used for field communications.<sup>123</sup> The IPKF initiated a 'spectral surveillance' programme which proved extremely productive. According to Major General Yashwant Deva, who served as Chief Signal Officer, Southern Command, and who was responsible for setting up the IPKF communications system in Sri Lanka, 'in *Operation Pawan*, 90 per cent of the tactical intelligence was gained through COMINT'.<sup>124</sup> The vulnerability of its communications was the LTTE's weakest point. As one commentator noted:

The IPKF's biggest achievement has been the smashing of the LTTE's communication network. With the walkie-talkies going out of action for fear of interception, a yawning gulf has developed between the LTTE cadres and the leadership.<sup>125</sup>

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122 *ibid.*

123 Dewa, 'Communication Issues', pp.78-80. See also Rohan Gunaratna, *War & Peace in Sri Lanka* (Institute of Fundamental Studies, Colombo, 1987), p.38.

124 Deva, 'Communication Issues', p.79.

125 Aniota Pratap, 'Jaffna: A Confused Populace', *India Today*, 15 December 1987, p.80.



## 32 *Signals Intelligence (SIGINT) in South Asia*

### (iii) *Kashmir*

SIGINT has evidently been of considerable value to Indian operations against 'militants' in Kashmir. For example, according to a report in 1993:

In Kashmir, some 25 per cent of the intelligence is generated through intercepts, but this is low-grade tactical stuff.<sup>126</sup>

In mid-1996, following elections in Kashmir in May which were remarkably free of violence and disruption, Indian SIGINT agencies intercepted radio communications between Pakistan's Directorate of Inter-Services Intelligence (ISI) and the militant secessionist leadership in Kashmir, which not only revealed much about the relationship between ISI and the militants, but more particularly expressed the anger of the ISI that the training, funds and arms with which it had supplied the militants had been wasted.<sup>127</sup> However, the use of sophisticated frequency-hopping radio equipment and encryption techniques by the 'top militant leaders' has generally frustrated Indian SIGINT operations at the strategic level.<sup>128</sup> On the other hand, the acquisition of advanced Western SIGINT systems since the late 1980s, such as the Racal RA 1792 HF and RA 1795 VHF/UHF COMINT and EW systems as well as 'more sophisticated direction-finding equipment' procured specifically for operations in the Kashmir valley, should significantly improve India's SIGINT abilities at the operational level.<sup>129</sup>

### **Coordination Machinery**

The principal reason for the relatively poor performance of the Indian SIGINT establishment, given its size and very extensive capabilities, is the lack of any comprehensive SIGINT policy and coordination machinery. As Major-General Yashwant Deva (Retd), former Chief Signal Officer, Southern Command, has written:

Like other advanced and developing countries, in India too, there are organisations dedicated to SIGINT and some

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<sup>126</sup> Joshi, 'Signal Wars', p.77.

<sup>127</sup> Rahul Bedi, 'Is Peace Possible in Troubled Kashmir?', *Jane's Intelligence Review*, August 1996, p.376.

<sup>128</sup> Joshi, 'Signal Wars', p.77.

<sup>129</sup> *ibid.*

hardware has been acquired, but we are yet to evolve a comprehensive policy for SIGINT. We have to divest ourselves of preconceived notions and parochial considerations and instead, adopt a systems approach with a view to unifying the effort and optimising the meagre resources that we can afford.<sup>130</sup>

The lack of effective coordination machinery is evident at several levels. The dozen or so agencies involved in SIGINT collection of one sort or another report to various bureaucratic departments and ministers. As Manoj Joshi has reported with respect to SIGINT activities in Kashmir:

In Kashmir they end up passing the same intercepts to the various masters - the Prime Minister, the Cabinet Secretary or the Army Chief - but do not share it with one another.<sup>131</sup>

There is no single mechanism which provides oversight, directive authority or coordination responsibility over all of the Indian SIGINT agencies and their operations; and where coordinating mechanisms have been instituted, they remain weak. Even in the case of military intelligence, notwithstanding the formal tasking and reporting relationships between the Military Intelligence Directorate, the Signals Intelligence Directorate and the Central Monitoring Organisation on the one hand, and the operational SIGINT units at the Army Command, Corps and Divisional levels on the other hand, the integration of strategic SIGINT, tactical SIGINT and electronic warfare (EW) capabilities remains unsatisfactory.<sup>132</sup> At the field and collection levels, the lack of coordination is reflected in numerous anecdotes. It is said, for example, that in Kashmir, 'the situation is so ludicrous that ... there is no antenna space at some vantage points'.<sup>133</sup> At both the national and operational/tactical levels, there are no mechanisms for coordinating SIGINT with signals security (SIGSEC) activities.

Over the past several decades, and seemingly every few years, organisational changes have been instituted with the intention of rectifying this state of affairs. A variety of committees and liaison

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130 Deva, 'Signal Intelligence: Concepts, Trends and Issues', *Strategic Analysis*, Vol.XIV, No.4, July 1991, p.475.

131 Joshi, 'Signal Wars', p.78.

132 Deva, 'Signal Intelligence', p.475.

133 Joshi, 'Signal Wars', p.78.

### 34 *Signals Intelligence (SIGINT) in South Asia*

mechanisms have been established. The Joint Intelligence Committee (JIC), which includes the Directors of RAW, the IB, the three service intelligence directorates and senior officers from the Ministries of Defence, Home Affairs and External Affairs, is the highest intelligence body in India. However, the JIC is not capable of providing effective coordination - it meets infrequently, and although it has a full-time Chairman and secretariat, its staff is too small and lacks specialist expertise. The Chairman JIC has no power over the various intelligence agencies. Efforts to use the JIC 'to bring about coordination and minimise serious lapses in intelligence functioning have generally come to nought'.<sup>134</sup> Some coordination is provided by the Joint Committee on Electronics and Communications (JCEC), which is part of the Military Wing of the Cabinet Secretariat,<sup>135</sup> but its purview is limited to particular matters (such as major equipment acquisition and facilities programmes) and does not extend across all the agencies involved in SIGINT activities. Within RAW there is a two-star Chief Military Intelligence Advisor (CMIA) responsible for liaison between RAW and the service intelligence directorates, but the CMIA is unable to provide the services with guidance or directions concerning collection of intelligence, and there remains no mechanism for coordinating operations between RAW and the services.<sup>136</sup>

#### **Balance and Cost-Effectiveness**

The lack of effective coordination and management machinery in the Indian intelligence establishment conduces gross inefficiencies, particularly at the collection and operational levels. It is not only that there is unnecessary and wasteful duplication of activity, with two or more agencies monitoring the same signals reporting the SIGINT to the same 'masters' - albeit through different organisational channels and subject to different degrees of processing, analysis and assessment. Given India's limited budgetary resources, duplication of activity inevitably means that important signal traffic is not monitored; there

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<sup>134</sup> Major-General M.L. Popli, 'National Intelligence Assessments and Estimates: Whither Our Joint Intelligence Committee?', *Indian Defence Review*, October 1991, pp.26,28. See also Major-General M.L. Popli, 'What Ails Our Intelligence System?', *Indian Defence Review*, January 1991, pp.61-5.

<sup>135</sup> Joshi, 'Signal Wars', p.77.

<sup>136</sup> Rao, *Prepare or Perish*, pp.417-19.



are important gaps which could be covered if duplicated activity was reduced.

There are, however, more profound consequences of the lack of coordination and management machinery than those that attend the duplication of effort. There is no mechanism for determining priorities or ensuring that resource allocation is optimised throughout the Indian intelligence community or across the various SIGINT agencies and activities. Major-General Yashwant Deva, for example, has argued that there is a serious imbalance in the resources and effort devoted to human intelligence (HUMINT) as compared to SIGINT:

Let us invest more on electronic intelligence gathering and less on HUMINT. It is not to confute the utility of the latter, but to suggest exercise of a balance in effort and budgeting to all intelligence gathering instruments, IMINT [imagery intelligence], SIGINT and HUMINT.<sup>137</sup>

A similar point has been made concerning the balance of resources between the various agencies and activities within the SIGINT category. Each of the armed services have separate SIGINT-dedicated platforms, each of which have their advantages in particular circumstances, but which may not necessarily add up to the optimal structure. For example, each of the services as well as the ARC operate airborne SIGINT systems. The airborne systems have greater operational flexibility than ground-based systems and are able to monitor VHF and microwave transmissions which are not within line-of-sight of ground stations - which, in turn, are able to provide much greater coverage of the frequency spectrum, and particularly strategic HF and SATCOM bands. In wartime, the fixed facilities are more vulnerable than the airborne systems; however, the airborne systems are very expensive to maintain and operate, especially if regular (for example, daily) flights are required. With a dozen different aircraft in the ARC and service inventories (Boeing 707s, *Learjet* 29As, *Gulfstream* IV SRAs, *Canberras*, An-12 *Cub* Bs, An-32 *Sutlejs*, Il-76 *Gajrajs*, HS 748 *Avros*, MiG-25R *Foxbat* Bs, Tu-142M *Bear* Fs, Dornier Do-228s and Il-38 *Mays*), some of which (such as the Boeing 707s and the An-12 *Cub* Bs) are old and particularly costly to maintain, and an inability to sustain regular patrols in many areas (because of both budgetary constraints

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<sup>137</sup> Deva, 'Signal Intelligence', p.475.



and poor serviceability of some of the older aircraft), the airborne SIGINT operations cannot be very cost-effective in peacetime.<sup>138</sup>

### Politicisation of the Indian SIGINT Establishment

A major factor impeding the effectiveness of the Indian intelligence community is the extent to which it is politicised. At least through the 1970s and 1980s, Indian intelligence agencies (including those responsible for SIGINT activities) have increasingly tended to work in support of the vested interests of particular political leaders as much as in the cause of national security - though the distinctions between politically inspired and directed operations and internal security operations is not always self-evident in an internal security environment as complex and profoundly disturbed as that which obtains in India.

In the late 1980s, the Intelligence Bureau (IB) was caught out on several occasions conducting intelligence operations against opposition politicians at the behest of Prime Minister Rajiv Gandhi and the Congress Party administration - including widespread bugging, telephone tapping and radio monitoring operations.<sup>139</sup> In 1991, General K.V. Krishna Rao, former Chairman of the Chiefs of Staff (1982-83) and Governor of Jammu and Kashmir, noted that:

At present, it would appear that the efforts of the organisation [the IB] are directed more towards obtaining [domestic] political intelligence rather than intelligence having a bearing on internal security.<sup>140</sup>

Elements of the RAW have also served as political instruments of Congress Party prime ministers. During the 1977 election campaign, for example, two companies of the Special Frontier Force (SFF), which was reportedly 'widely known in intelligence circles as Indira Gandhi's "Own Force"', were placed on alert 'to counter any riots by opposition parties', and an ARC An-12 *Cub* aircraft was placed on standby at Sarsawa for Mrs Gandhi.<sup>141</sup> More recently, it is alleged that during the

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138 *ibid.*; and Joshi, 'Signal Wars', p.78.

139 See, for example, Salamat Ali, 'Bugging Ploy Backfires', *Far Eastern Economic Review*, 1 September 1988, pp.30-1; and 'Intelligence: The Making or Breaking of India's Singh Administration?', p.25.

140 Rao, *Prepare or Perish*, pp.418-19.

141 Bobb, 'Blunting the Edge', p.85.

1989 election campaign, RAW (as well as the IB) conducted operations against opposition parties and collected political intelligence for Rajiv Gandhi.<sup>142</sup>

The use of intelligence agencies and facilities for domestic political purposes has inevitably diverted resources (including SIGINT resources) away from more legitimate national security activities - including those concerned with external as well as internal security.<sup>143</sup>

### Communications Security (COMSEC)

A significant weak link in the Indian SIGINT establishment lies in the area of communications security - poor COMSEC practices, the lack of a comprehensive COMSEC policy and machinery for coordinating the various COMSEC activities at the agency level, and poor integration of COMSEC activities with SIGINT collection operations.

Much of the problem is due to the plethora of disparate organisations involved in Indian SIGINT/COMSEC activities. All of the agencies involved in SIGINT collection have some COMSEC responsibilities, even if only with respect to their own communications. Within the SIGINT establishment, the agency with the principal responsibility for monitoring for breaches of signals security is the Central Monitoring Organisation (CMO) of the Military Intelligence Directorate/Signals Intelligence Directorate (MID/SID), but it is 'functionally ineffective'.<sup>144</sup> Various civil authorities, such as the Wireless Planning and Coordination Cell of the Ministry of Communications, also have responsibility for monitoring abuses and infringements of frequency spectrum management regulations, but there has been little attempt to coordinate the activities of these civil authorities and those of the CMO.<sup>145</sup>

The lack of a comprehensive COMSEC policy or COMSEC coordination machinery results in many of the same problems that have bedevilled the Indian SIGINT establishment at large. There is

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142 'The RAW Truth', *India Today*, 15 February 1990, p.5; and 'Intelligence: The Making or Breaking of India's Singh Administration?', p.25.

143 See Bruce Vaughn, 'The Use and Abuse of Intelligence Services in India', *Intelligence and National Security*, Vol.8, No.1, January 1993, p.18.

144 Deva, 'Communication Issues', p.80.

145 *ibid.*, pp.78-80.

wasteful duplication of effort, with two or more agencies monitoring the same circuits or frequencies for security breaches; and there are significant gaps, with leakages through insecure radio and telecommunications systems that remain unmonitored. The plethora of security agencies, each with different interests, responsibilities and concerns about communications security, admits poor COMSEC practices. For example, the protection of Indian VIPs against terrorist attack involves some half a dozen intelligence and security agencies, including the Intelligence Bureau (IB), the Border Security Force (BSF), the National Security Guards (NSG), the Special Protection Group (SPG), various army units, and local police forces. The police forces tend to be 'totally innocent' of COMSEC practices.<sup>146</sup> It is worse than useless for one of these agencies to transmit signals in code concerning the movement of VIPs if the police transmit the same messages in clear. Not only is the safety of the VIPs jeopardised, but 'the codes get compromised'.<sup>147</sup>

An effective and efficient SIGINT establishment requires a close coordination of COMSEC and SIGINT collection activities. On the one hand, there needs to be some mechanism whereby the SIGINT collection authorities can keep those concerned with COMSEC continually informed about insecure transmission systems and poor signals discipline. On the other hand, the COMSEC authorities need to keep those involved in SIGINT collection informed of developments in sophisticated signal transmission systems and cryptographic techniques, and of particular vulnerabilities that might be exploited, in order to enhance the latter's interception and decryption capabilities. SIGINT collection and COMSEC are, in a technical sense, two sides of the same coin. There is no machinery in the Indian SIGINT establishment for ensuring that a close and effective working relationship is maintained between those involved in the two activities.

## Conclusion

The performance of the Indian SIGINT establishment has been quite mixed. There have been some notable achievements, especially at the tactical level, but, overall, the cost-effectiveness of India's SIGINT activities must be reckoned to be fairly low. Some informed

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<sup>146</sup> *ibid.*, p.80.  
<sup>147</sup> *ibid.*



critics have argued that there should be a greater investment of resources in SIGINT capabilities and operations,<sup>148</sup> but resources are not the crux of the problem. India already has one of the largest SIGINT establishments in Asia, but it is less effective than those of many other countries in the region. There may be a case for additional capabilities in some particular areas, but these are likely to be most fruitful with respect to coordination machinery (for example, data exchange systems and networks linking major intercept facilities and processing centres at strategic, operational and tactical levels) and COMSEC, rather than additional collection capabilities.

The critical requirement is rationalisation of the Indian SIGINT effort. There are simply too many agencies trying to do too many things - some of which (such as monitoring satellite television broadcast channels) are of much lower value than others; some of which are too expensive to justify in peacetime (such as airborne SIGINT operations along the border with China); and some of which (such as operations against opposition groups during election campaigns) should be eschewed entirely in a democracy. India's SIGINT activities are over-extended and lack proper focus.

The Indian SIGINT establishment needs to be profoundly reconstituted. The frequent reorganisations over the past quarter of a century have proved inconsequential because they missed the point. The problems besetting the Indian SIGINT establishment are too fundamental to be addressed by the creation of another agency, board or committee, let alone by changes in the terms of reference or internal structures of the extant agencies. India's SIGINT activities need to be brought together into a single organisation dedicated to all aspects of SIGINT activity - interception, processing, cryptanalysis and analysis as well as COMSEC. As Major General Yashwant Deva has argued with respect to SIGINT activities at the national and strategic levels:

[India must] have a common SIGINT organisation at national and strategic levels responsible for all aspects of interception of hostile emissions and security monitoring rather than the multiplicity with which we are now saddled.<sup>149</sup>

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148 See, for example, Deva, 'Signal Intelligence', p.475.

149 *ibid.*



#### 40 *Signals Intelligence (SIGINT) in South Asia*

This organisation should also embrace tactical SIGINT and electronic warfare (EW) activities, at least insofar as a close and effective working relationship is satisfied. This dedicated SIGINT organisation would need to be complemented by some machinery for coordination, liaison and exchange with other elements of the Indian intelligence and security community, as well as some Cabinet-level machinery for management and direction of the whole Indian intelligence and security effort. The result should be a dramatic qualitative improvement in India's SIGINT activities.

## CHAPTER 2

# SIGNALS INTELLIGENCE (SIGINT) IN PAKISTAN

Pakistan was founded in 1947, but Britain had begun using it as a site for SIGINT operations some four decades before, when a station was established at Abbottabad, some 50 km north of Islamabad, to intercept and decrypt Persian, Afghan and Russian signals.<sup>1</sup> In the early 1920s, 'smaller, mobile intercept posts were established in a few mountain fortresses on [then] India's North-West Frontier, which were to prove extremely useful'.<sup>2</sup> Further additional SIGINT stations were established on the North-West Frontier in the 1930s.<sup>3</sup>

In 1930, the Abbottabad station was evidently relocated (as No.1 Wireless Company) to Cherat, where it was principally engaged in intercepting diplomatic traffic in the Far East, sending back the intercepts to GCCS at Broadway in London for cryptanalysis.<sup>4</sup> (GCCS moved from London to Bletchley Park in 1939.) By 1939, the operation had moved back to Abbottabad; and it now involved 'nearly 200 Royal Signals personnel and an Intelligence Section ..., [who] were intercepting Russian and Japanese and other diplomatic ciphers and in 1940 were concentrating on the Red Army in the southern USSR'.<sup>5</sup> At this time, No.1 Wireless Company came directly under the control of GHQ India in Delhi.<sup>6</sup>

### Wartime Operations in Pakistan

British SIGINT stations in Pakistan played an important role in the war against Japan. During the Second World War, Britain maintained three major SIGINT stations in Pakistan - the station at

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1 Stripp, *Codebreaker in the Far East*, p.50.  
2 Nigel West, *GCHQ: The Secret Wireless War, 1900-86*, pp.75-6.  
3 *ibid.*, p.92.  
4 Skillen, *Spies of the Airwaves*, p.496.  
5 *ibid.*  
6 *ibid.*, p.497.

**Figure 2.1: SIGINT Stations in Pakistan, 1904-45**



Abbottabad; an intercept and DF station at Quetta, in mid-Pakistan near the border with Afghanistan;<sup>7</sup> and a Royal Navy DF station at Karachi.<sup>8</sup>

During the Second World War, the Abbottabad station operated as the Wireless Experimental Depot (WED), serving the Advanced Headquarters Allied Land Forces South East Asia (ALFSEA) and the Wireless Experimental Centre (WEC) in Delhi, and the WEC's Eastern Wireless Sub-Centre (EWSC) at Barrackpore. In addition to operating in the chain of DF stations for the EWSC,<sup>9</sup> the station was also used to train SIGINT personnel for the stations at Barrackpore and Tezpur.<sup>10</sup>

### Postwar Operations at the Abbottabad Station

In 1945-46, the WED station at Abbottabad was used to intercept and decrypt Persian and Afghan signals. By this time, Abbottabad had declined to a 'small' operation, with less than a dozen signals and intelligence officers, and a small group of British sergeants and other ranks, but still 'a very large body of Indian civilian wireless operators [who] carried out the detailed intercepting'.<sup>11</sup>

The Persian section was the principal centre of activity at this time. According to Alan Stripp, who worked in this section during this period:

Our immediate concern was with Azerbaijan, the extreme north-west province of Iran just across the frontier from the Soviet republic of the same name. At one point in the war the Allies had taken over much of the transport organisation in Iran for fear that German influence might prevail in preventing our use of the rail network for supplies to the Soviet Union; the Russians occupied a broad control zone in north Iran while we looked after the south. It now seemed that Russia might seek to prolong its stay in the north-west corner of the temporary zone, using the argument of the

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7 Skillen, *Spies of the Airwaves*, p.517 and map inside back cover.

8 *Radio Warfare*, Technical Staff Monographs 1939-1945, C.B. 03209 (Signal Division, Admiralty, London, 1949), Diagrams 1 and 2.

9 Skillen, *Spies of the Airwaves*, p.520.

10 *ibid.*, pp.517, 519.

11 Stripp, *Codebreaker in the Far East*, p.50.



#### 44 *Signals Intelligence (SIGINT) in South Asia*

undoubted common origin of the race which straddles the frontier. This was, I believe, the first major problem to arise after the Allied victory in 1945, and the 'Azerbaijan dispute' was one of the first occasions on which the phrase 'the cold war' was heard.

All this threatened to rock the boat, and Abbottabad was concerned with finding out what it could about Iran's real intentions. The traffic we studied, therefore, was not military but diplomatic.<sup>12</sup>

The Persian diplomatic traffic was easy to read. There was only a single, three-letter alphabetical code system, which covered 'every aspect of diplomatic and consular activity from summaries by overseas press attachés of local newspaper reports on Iran ... to routine requests for permission to issue a visa'.<sup>13</sup> There was a different substitution table for the code groups each day, but, as Alan Stripp has noted, 'so simple a form of concealment was already naively inadequate by the 1920s, let alone the 1940s'.<sup>14</sup> Moreover, the fact that the traffic included obviously available reports, such as press releases, enabled 'frequent cribs'.<sup>15</sup>

The Afghani encrypted material was even easier to read, since it was 'almost identical in pattern to the Persian' but the substitution tables were not changed daily; they were simply 'shunted backwards and forwards, sometimes at random but sometimes in regular order'.<sup>16</sup> Hence, according to Alan Stripp:

[breaking the code] took a short time. I used to wonder whether the Afghan clerk [receiving and decrypting the signal] over the frontier was getting there first.<sup>17</sup>

#### Post-Independence

When Pakistan and India achieved their separate independence from Britain in 1947, it was undoubtedly Pakistan that

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12 *ibid.*, pp.50-1.

13 *ibid.*, pp.51-2.

14 *ibid.*, p.51.

15 *ibid.*, p.52.

16 *ibid.*, pp.52-3.

17 *ibid.*, p.53.

benefited most from the indigenous involvement in British intelligence activities over the previous decades and through the Second World War. Muslims had been heavily over-represented (as compared to Hindus) in these British intelligence activities. In the case of the (British) Indian Intelligence Bureau, which was responsible for both foreign intelligence operations (focused particularly on Persia, Afghanistan and the Soviet Union) and counter-espionage and internal security operations, most of the local staff were Muslims, who moved from Delhi and Simla to found the Intelligence Bureau of Pakistan (IBP) in 1947. (The first director of the IBP was Gulam Mohamed, who had been the senior indigene in the Indian Intelligence Bureau under the British.)<sup>18</sup> The Indian Army's Intelligence Corps, which was formed in 1942, had had its headquarters in Karachi.<sup>19</sup>

With respect to SIGINT activities, Muslims comprised the great majority of the several thousand 'Indians' who were involved with British SIGINT operations during the Second World War. A large proportion of the Indian Signal Corps troops and 'civilian wireless operators' who performed the intercept operations at the major Indian SIGINT stations (at, for example, Delhi, Bangalore, Barrackpore, Abbottabad and Imphal) were Muslims. At Barrackpore, for example, the Indian Signal Corps troops who performed the intercept operations were 'Punjabi Mussulman'.<sup>20</sup> The operators at the Imphal station, who came principally from Madras, included a significant proportion of Muslims.<sup>21</sup> Most of the local staff at the Abbottabad, Quetta and Karachi stations were also Muslims who stayed in Pakistan after independence.

### *Operational SIGINT, 1947-71*

Pakistani SIGINT units have provided the military commands with valuable intelligence concerning operational matters since 1947, when the first war with India began, and through the second (August-September 1965) and third (December 1971) wars with India. This has included indications and warning intelligence about Indian military

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<sup>18</sup> Raina, *Inside RAW*, p.7.

<sup>19</sup> Bhashyam Kasturi, 'Military Intelligence in India: An Analysis', *Indian Defence Review*, Vol.9, No.1, January 1994, p.72.

<sup>20</sup> Skillen, *Knowledge Strengthens the Arm*, p.440.

<sup>21</sup> *ibid.*, p.435.

#### 46 *Signals Intelligence (SIGINT) in South Asia*

plans and preparedness activities; order of battle (OB) intelligence on Indian military units, locations and movements; and intelligence about particular engagements.

The Pakistani Army moved quite quickly to establish radio intercept capabilities. By the beginning of December 1947 (three and a half months after the formation of Pakistan and just weeks after conflict began in Kashmir), Pakistani SIGINT units were monitoring the radio nets between the various Indian brigade, battalion and regiment HQs in Kashmir and the Division HQ in Srinagar. For example, an 'intercepted wireless message' from an Indian Brigade Commander to Srinagar disclosed the Indian decision to withdraw from Uri, about halfway along the main road between Srinagar and the Pakistan border.<sup>22</sup> By the middle of April 1948, 'intercepted messages' had revealed Indian plans for a major spring offensive in Kashmir and prompted the Pakistani intervention to contain the Indian forces.<sup>23</sup> In July 1948, Pakistani commanders evinced sufficient familiarity with Indian ground-to-air communication nets to use monitoring of these nets in a deception/air ambush operation which resulted in the shooting down, over Chakoti, of two Indian ground support aircraft.<sup>24</sup>

In the case of the second India-Pakistan war, in August-September 1965, SIGINT provided valuable indications and warning intelligence concerning Indian military planning and preparations, as well as very useful tactical intelligence in some important operational situations during the war. As early as March 1965, 'increased wireless traffic on the Indian side' disclosed a series of visits by ministers and senior military officers from Delhi to forward positions for in-the-field discussions of Indian war plans.<sup>25</sup> By 4 September, two days before India attacked into Pakistan on 6 September, Pakistani commanders had been alerted by SIGINT to the imminence of the Indian attack.<sup>26</sup> On the night of 5/6 September, border posts maintained by the Pakistan Air Force (PAF) Wireless Observer Wing detected and provided some tactical warning of Indian troop movements across the

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22 Major General Akbar Khan (Retd), *Raiders in Kashmir* (Pak Publishers Limited, Karachi, 1970), p.83.

23 *ibid.*, p.99.

24 *ibid.*, pp.144-5.

25 Brigadier Gulzar Ahmed, *Pakistan Meets Indian Challenge* (Al Mukhtar Publishers, Rawalpindi, 1967), p.67.

26 *ibid.*, pp.112, 125.



frontier.<sup>27</sup> On the morning of 6 September itself, Pakistani SIGINT units intercepted 'Indian General' flash signals informing Indian commanders of the outbreak of the war (and, incidentally, disclosing some confusion on the Indian side as to the circumstances of the outbreak).<sup>28</sup>

(i) 6/9/65

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FROM NAVAL HEADQUARTERS (India)  
TO HOLDERS OF INDIAN GENERAL MESSAGES

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356. I.G. (.) WAR HAS BROKEN OUT WITH PAKISTAN  
061025

(ii) 6/9/65

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FROM NAVAL HEADQUARTERS (India)  
TO HOLDERS OF INDIAN GENERAL MESSAGES

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357. I.G. (.) CANCEL 356 I.G. OF 6 SEPT

(iii) 6/9/65

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FROM NAVAL HEADQUARTERS (India)  
TO HOLDERS OF INDIAN GENERAL MESSAGES

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362 I. G. (.) 356 I.G. of 6 EP WAS ISSUED UNDER THE  
MISTAKEN IMPRESSION THAT PAKISTAN HAD  
DECLARED WAR (.) THE FACT IS THAT THEY DECLARED  
A STATE OF EMERGENCY (.) THIS IS FOR YOUR  
INFORMATION 1207

Throughout the period from 6 September to the end of the war on 22 September, SIGINT provided Pakistani commanders with a continuous stream of intelligence concerning Indian movements, plans and intentions, and perceptions and morale, which was used to good effect in Pakistani planning - to move some force elements and to reinforce others for blocking purposes, and to target particular installations located by signal monitoring activities. On the morning of 6 September itself, for example, 'an intercepted wireless message'

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<sup>27</sup> General Mohammad Musa (Retd), *My Version: India-Pakistan War 1965* (Wajidalis, Lahore, 1st edn 1983), p.48.

<sup>28</sup> Ahmed, *Pakistan Meets Indian Challenge*, pp.196-7.



## 48 *Signals Intelligence (SIGINT) in South Asia*

disclosed that Indian forces were planning to capture Kasur, just 50 km south of Lahore, but the Pakistani Army was able to fight off the attack.<sup>29</sup> On 16 September, intercepted radio communications enabled Pakistani commanders to monitor the progress of Indian armour and infantry in the area near Chawinda - and to prepare a killing ground on which more than 2000 Indian troops (including three battalion commanders) died that day.<sup>30</sup>

In addition to providing intelligence on Indian Army deployments and movements, Pakistani SIGINT provided a picture of the state of the morale and determination of the Indian forces. In the case of the Indian Air Force, this was found to be quite poor. According to an account by Brigadier Gulzar Ahmed:

The state of the Indian Air Force at this time [around 13 September] could be judged from some of the intercepts of Indian R/T messages. The Indian pilots were found to be reluctant to take on PAF. They put forward various excuses which ranged from low state of fuel, lack of radar contact, imaginary mechanical defects and poor control from their controllers.<sup>31</sup>

Already, on 1 September, SIGINT had contributed directly to the shooting down of four Indian Vampire aircraft: a signal from an Indian field commander in Chhamb to Indian Air Force HQ requesting air support was intercepted and reported to the PAF 'post-haste', enabling Pakistani fighter aircraft to prepare an air ambush for the Indian aircraft.<sup>32</sup> On 10 and 11 September, monitoring of the Armitisar Radar Station enabled its exact location and operational status to be determined and for the PAF to attack and incapacitate the station.<sup>33</sup>

During the third India-Pakistan war in December 1971, in addition to military SIGINT activities, Pakistan maintained a monitoring post in the Martial Law Headquarters in Dacca in East Pakistan (Bangladesh) for political intelligence. For example, the post monitored broadcasts by Sheikh Mujibur Rehman announcing the

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29 *ibid.*, p.126.

30 *ibid.*, pp.144-5.

31 *ibid.*, p.183.

32 *ibid.*, pp.169-70.

33 *ibid.*, pp.179-80.

formal proclamation of 'the People's Republic of Bangla Desh' and enjoining his supporters 'to resist the [Pakistani] army of occupation to the last'.<sup>34</sup>

### *The US Connection*

#### (i) *The Bada Bier Station*

From 1958 to 1970, the United States maintained one of the largest SIGINT stations in the world in Pakistan - at Bada Bier, near Peshawar, some 140 km west of Islamabad, just 30 km from the Khyber Pass into Afghanistan, and only 240 km from the Soviet border.

A US Air Force Security Service (AFSS, predecessor of the Electronic Security Command) SIGINT unit, initially designated the 6937th Security Flight (Provisional), was organised at Peshawar on 1 February 1958. It became operational with a limited capability on 22 April 1958, and was redesignated the 6937th Communications Group on 1 July 1958.<sup>35</sup> A ten-year lease agreement was signed on 18 July 1959.<sup>36</sup>

At its peak, more than 3000 US personnel and some 300 Pakistanis worked at the base.<sup>37</sup> A wide range of SIGINT systems was deployed at the station, including a large circularly disposed antenna array (CDAA) and other elements of the USAFSS Program 466-L world-wide SIGINT network.<sup>38</sup> According to press accounts published in the late 1960s:

[The Bada Bier base was] able to listen to the countdown on space shots or nuclear explosions of Soviet Union held in

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<sup>34</sup> Siddiq Salik, *Witness to Surrender* (Oxford University Press, Karachi, 1977), pp.43, 75.

<sup>35</sup> James E. Pierson, *A Historical Study of the Organizational Development of United States Air Force Security Service 1970-1974* (United States Air Force Security Service, San Antonio, Texas, 15 September 1974), pp.44-5.

<sup>36</sup> Ernest Weatherall, 'Pakistan Orders Closure of U.S. Listening Post', *Christian Science Monitor*, 28 May 1968, p.1; Ernest Weatherall, 'Bada Bier Exit Ends U.S. "Spy" Era', *Christian Science Monitor*, 14 January 1970, p.11; and Harvey Yale, *Close Out of the 6937th Communications Group Peshawar Pakistan* (Air Force Office of History, Washington DC, 1970).

<sup>37</sup> William J. Coughlin, 'U.S. Is Dismantling Peshawar Spy Base', *Washington Post*, 10 April 1969, p.A15.

<sup>38</sup> R.T. Pretty (ed.), *Jane's Weapon Systems 1978* (Macdonald and Jane's Publishers Limited, London, 9th edn 1977), p.297.

Central Asia. With its highly sophisticated electronic equipment, it could listen into radio conversations between Soviet tanks, army headquarters, and even fighter planes ...<sup>39</sup>

The strategically located base was ... a highly sophisticated and computerized listening post to eavesdrop on electronic communications within the Soviet Union and China. From here, tape recordings could be made of missile countdowns, military conversations, civilian radiotelephone communications and other electronic emanations from Central Asia.<sup>40</sup>

On 6 April 1968, the Pakistani government informed Washington that the Bada Bier site would have to be vacated at the expiration of the 10-year lease in July 1969.<sup>41</sup> Much of the equipment at the base - including 'acres of towers and antennas ... and electronic listening equipment' - was removed in early 1969.<sup>42</sup> (Some of the equipment was reportedly moved to a large SIGINT station which the United States established in north India in 1969, from where it was used to monitor both Soviet missile and space activities in southern USSR and Chinese nuclear and missile activities in Sinkiang - as well as communications and other electronic activity in Pakistan!)<sup>43</sup> The Bada Bier base was officially handed over by the US Air Force to the Pakistani government on 7 January 1970.<sup>44</sup>

The United States was permitted to re-establish the Bada Bier/Peshawar station in the early 1980s - including for both ground-based and airborne SIGINT operations. In the first instance, the United States was desperate to replace the SIGINT facilities in Iran,

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39 Ernest Weatherall, 'Pakistan Orders Closure of U.S. Listening Post', *Christian Science Monitor*, 28 May 1968, p.1.

40 Coughlin, 'U.S. Is Dismantling Peshawar Spy Base', p.A15.

41 Weatherall, 'Pakistan Orders Closure of U.S. Listening Post', p.1; and Coughlin, 'U.S. Is Dismantling Peshawar Spy Base', p.A15.

42 Coughlin, 'U.S. Is Dismantling Peshawar Spy Base', p.A15.

43 See Coughlin, 'U.S. Spy Base in India Eyes China Atom, Missile Activities: Shifted From Pakistan in 1969', p.5.

44 See Weatherall, 'Bada Bier Exit Ends U.S. "Spy" Era', p.11; Pierson, *A Historical Study of the Organizational Development of United States Air Force Security Service 1970-1974*, pp.9, 44-5; and Yale, *Close Out of the 6937th Communications Group Peshawar Pakistan*.



which had been used to collect TELINT from the Tyuratam space and missile test facility, and which it had had to abandon quickly in January-February 1979.<sup>45</sup> Very soon, however, the station was also being used to monitor the war in Afghanistan - including communications from Moscow to Kabul, the order of battle of Soviet units and their deployments and movements, and signals associated with operational activities. The actual site of the SIGINT station is believed to be at Parachinar (33° 55' N; 70° 05' E), which is about 12 km from the Afghanistan border, 125 km west of Peshawar, and has an elevation of approximately 6000 feet.

**(ii) Detachment 2, 6937th Communications Group, USAFSS, Karachi**

In early 1960, the US Air Force Security Service (USAFSS) organised a Detachment of 6937th Communications Group from Bada Bier at Karachi. The activity was closed down on 1 October 1965.<sup>46</sup>

**(iii) Airborne SIGINT Activities**

From the beginning, the Bada Bier site served as a major base for airborne SIGINT operations against the Soviet Union. In the early 1960s, it was used by the CIA for U-2 flights, involving the collection of both SIGINT and photographic intelligence (PHOTINT) along the southern border of the USSR and sometimes into Soviet territory. It was, for example, the base from which Francis Gary Powers began his ill-fated attempt at the first complete overflight of the Soviet Union on 1 May 1960. Powers' U-2 was equipped with cameras for PHOTINT and a wide variety of SIGINT systems for monitoring and recording military communications, radar signal parameters and other electronic activity associated with air defence systems as he traversed the USSR.<sup>47</sup>

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<sup>45</sup> Colonel William V. Kennedy, *Intelligence Warfare* (Crescent Books, New York, 1983), p.124; 'Strategy's Friends', *Toronto Globe & Mail*, 16 December 1986, p.31; and "Massive Military Construction in Pak", *Hindustan Times*, 13 October 1987, p.15.

<sup>46</sup> Pierson, *A Historical Study of the Organizational Development of United States Air Force Security Service 1970-1974*, p.45.

<sup>47</sup> See Mario de Arcangelis, *Electronic Warfare: From the Battle of Tsushima to the Falklands and Lebanon Conflicts* (Blandford Press, Poole, Dorset, 1985), pp.129-30.



In early 1964, two US Air Force RB-57F PHOTINT/ELINT aircraft were deployed to Bada Bier for operations against India. These were sometimes flown by CIA personnel, sometimes with Pakistan Air Force markings. (The two aircraft were officially assigned to No.24 Squadron of the Pakistan Air Force.) During 1964-65, these aircraft provided comprehensive maps of Indian radar and other electronic emission facilities, which proved very useful during the war with India in August-September 1965. One of the aircraft was returned to the United States before the outbreak of the war, but the other was intensively involved in intelligence collection and electronic warfare operations in September 1965.<sup>48</sup>

The United States resumed airborne SIGINT operations from Pakistan in the early 1980s, when access to the Bada Bier/Peshawar base was re-negotiated. These operations evidently involved TR-1 (or new U-2R) aircraft, specially configured for high-altitude TELINT collection flights along the southern border of the Soviet Union, and were designed to compensate for the loss of the SIGINT/TELINT ground stations in Iran in early 1979 and the inability of the Rhyolite/Aquacade and Chalet/Vortex geostationary SIGINT/TELINT satellites to quickly or fully make up for this loss.<sup>49</sup>

In 1983, the United States began to use Pakistani air bases, and most commonly Maripur, near Karachi, for P-3 *Orion* long-range ocean surveillance patrols over the Arabian Sea and western Indian Ocean.<sup>50</sup>

(iv) *The United States and the Afghanistan War*

Following the Soviet invasion of Afghanistan in 1979-80, the United States was both able to use the re-established SIGINT facilities at Bada Bier/Parachinar and also to provide extensive resources to the Pakistani SIGINT authorities for monitoring the war. As Brigadier Mohammad Jousaf, head of the Afghanistan Bureau of the Directorate of Inter-Services Intelligence (ISI) of the Pakistani armed forces from 1983 to 1987 has written:

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48 Dick van der Aart, *Aerial Espionage: Secret Intelligence Flights by East and West* (Arco/Prentice Hall Press, New York, 1985), pp.26-7.

49 Kennedy, *Intelligence Warfare*, p.124.

50 See Lawrence Lifschultz, 'New U.S. Spy Flights from Pakistan', *The Nation*, 29 November 1986, pp.593, 606, 608 and 610; and "'Massive Military Construction in Pak'", p.15.

The CIA ... contributed substantially with the installation of wireless interception equipment. I was not involved directly with this type of aid, although I know it was generous and gave me a reliable, up-to-the-minute source of both Soviet and Afghan intercepted radio messages. This was high-grade tactical information on the movement of units, and sometimes their intentions. Often the messages would be tense and dramatic, as when we heard operators under attack yelling their orders, or frantically calling for help. It was listening in to some of these exchanges that confirmed the high level of mistrust that existed between the Soviets and Afghans. Once the Mujahideen had acquired Stingers we would hear Afghan pilots objecting to being sent on risky missions, while the Soviet helicopters remained at base. In one instance a Soviet headquarters was threatening to court-martial a junior officer who was insisting he must withdraw from his post. It was also radio interception that gave us feedback on the success or otherwise of some of our Mujahideen attacks in terms of damage caused or casualties inflicted.<sup>51</sup>

### *Soviet/Russian SIGINT Activity in Pakistan*

There are two Russian diplomatic establishments in Pakistan that are used for SIGINT operations - the Consulate in Bleak House Road in Karachi and the Embassy in Islamabad.<sup>52</sup> In 1976, it was reported that more than 75 Soviet Committee for State Security (KGB) and Chief Intelligence Directorate (GRU) officers were based in these two establishments,<sup>53</sup> and it was estimated in 1986 that a total of about 20 were engaged in SIGINT operations in the two posts.

In December 1973, the Headquarters of the US European Command (HQ USEUCOM) reported that during the October 1973

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51 Brigadier Mohammad Yousaf and Major Mark Adkin, *The Bear Trap: Afghanistan's Untold Story* (Leo Cooper, London, 1992), p.94.

52 Desmond Ball, 'Soviet Signals Intelligence: The Use of Diplomatic Establishments' in Floyd C. Painter (ed.), *The International Countermeasures Handbook* (EW Communications, Palo Alto, California, 13th edn 1988), p.38.

53 'KGB in Asia', *Far Eastern Economic Review*, 31 December 1976, p.34.

## 54 *Signals Intelligence (SIGINT) in South Asia*

Yom Kippur War in the Middle East, the KGB and GRU conducted SIGINT collection at the Karachi post.<sup>54</sup>

### *Pakistan's National and Strategic SIGINT*

Pakistan has two principal intelligence organisations: the Intelligence Bureau, which was established in 1947, which is staffed by civilians and has mostly been headed by civilians, reports directly to the prime minister, and is responsible for both external political intelligence and counter-espionage and internal security operations; and the Directorate of Inter-Services Intelligence (ISI) of the Pakistan armed forces, which is headed by a three-star general and is staffed by personnel from all three services, and is responsible for both national/strategic intelligence and coordination of tactical/operational military intelligence. Although it is likely that the Intelligence Bureau has some independent SIGINT capabilities (for example, in the Pakistani Embassy complexes in Riyadh and New Delhi), primary responsibility for Pakistani SIGINT activities lies with the ISI.

The ISI coordinates national and strategic SIGINT activities. The actual communications interception operations are the responsibility of Inter-Services Signals Units (ISSUs), which form part of the Joint Services Intelligence Bureau (JSIB). Detachments are located at vantage points and cover both the eastern and western borders. These are tasked to intercept and locate net radio, radio relay and microwave transmissions in India, Afghanistan and Iran.<sup>55</sup> In August 1988, for example, Pakistan reportedly intercepted Afghanistan radio communications concerning Afghani involvement in the airplane crash in which Pakistani President Zia ul-Haq was killed.<sup>56</sup>

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54 Headquarters United States European Command, *COMSEC Assessment During October 1973 Mid-East Conflict* (HQ USEUCOM, Vaihingen, Germany, ECJ-A-73-0045-S, December 1973), p.A-3.

55 Deva, 'Signals Intelligence', p.474.

56 Jim McGee, 'Expert Backs Pakistan on Crash Cause: Mechanical Failure of Zia Plane Ruled Out; Sabotage Suggested', *Washington Post*, 21 October 1988, p.A25.



**Table 2.1: Directors-General, Inter-Services Intelligence (ISI) 1980-94**

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Lt General Akhtar Abdul Rehman Khan	1980-87
Lt General Hamid Gul	1987-June 1989
Lt General Shamsul Rehman Kallu	June 1989-August 1990
Major General Asad Durrani	August 1990-March 1992
Lt General Javed Nasir	March 1992-

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Pakistan reportedly maintains a SIGINT station in Baluchistan in the extreme south-west of the country, between the borders with Iran and Afghanistan (either near Saindak, just across the border with Iran, or higher up in the Chagai Hills), which is used to monitor communications in Iran, including those involving a (former Soviet) SIGINT complex near the Kuh-e Malik Siah Mountain, some 50 km north-west of Zahedan.<sup>57</sup>

In 1986, it was reported that 'electronic intelligence facilities' had been built at Gwadar, in the extreme southwest corner of Pakistan and just 80 miles from Iran's major naval facility Chah Bahar, 'and elsewhere along the Baluchistan coast'.<sup>58</sup> And in 1987, it was reported that 'massive military construction was going on along the Makran [Baluchistan] coastline, including the laying of a sophisticated electronic network'.<sup>59</sup> Constructed with US assistance, the Makran/Baluchistan network is most likely concerned with monitoring naval traffic in the Arabian Sea and the northeastern approaches to the Gulf of Oman and the Persian Gulf.

### *Tactical SIGINT*

At the battlefield level, Pakistani SIGINT capabilities have recently 'undergone a sea change'.<sup>60</sup> Previously there was an EW company (equipped primarily for COMINT rather than EW) with each corps. The new concept stresses the synthesis of COMINT and EW, with each corps now having a SIGINT battalion and an EW brigade.

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57 'Tuning In', *Time*, 8 March 1982, p.32.

58 Lifschultz, 'New U.S. Spy Flights From Pakistan', p.610.

59 "'Massive Military Construction in Pak'", p.15.

60 Deva, 'Signals Intelligence', p.474.

Most of the new hardware has been acquired from the United States, with some from China and France.<sup>61</sup>

### *The Pakistani Navy*

The Pakistani Navy maintains half a dozen different types of ELINT/ESM systems, deployed aboard maritime surveillance aircraft, submarines and surface ships. These systems were acquired from the United States, Britain, West Germany and France. Some of the systems are obsolete, having been designed and developed in the 1960s. However, the navy is currently in the process of modernising and standardising much of its ELINT/ESM capability with the French Thompson-CSF DR 3000 series of airborne and naval ESM systems.<sup>62</sup>

The Thompson-CSF DR 3000 series of ELINT/ESM systems are designed for land, ship, submarine or aircraft operation. The basic system consists of a processing unit, display unit, and an antenna system (one omni-directional and six directional arrays), which provide a very high detection and interception capability around 360° and high sensitivity across the frequency coverage from the D to J bands. It is able to provide warning, surveillance, ELINT and target designation for ECM systems.<sup>63</sup>

The Pakistan Navy operates four Dassault-Breguet 1150 *Atlantic* maritime patrol aircraft and three Fokker F-27 *Maritime* aircraft for maritime surveillance purposes. Contracts have recently been awarded to Thompson-CSF to upgrade two of the *Atlantics* with the DR 3000A airborne version of the DR 3000 systems, with an option to upgrade the other two later; and to install the DR 3000A aboard one of the F-27s.<sup>64</sup>

The navy's surface combatants are currently equipped with a variety of ELINT/ESM systems. The *Babur* (ex-HMS *London*) DDH destroyer is equipped with the Phoenix II ESM system, produced by ARGO Systems Inc. in Sunnyvale, California, which provides automatic identification and bearing of intercepted radar emissions in

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61 *ibid.*

62 'Pakistan Updates Maritime Aircraft', *Jane's Defence Weekly*, 20 November 1993, p.24.

63 See Blake (ed.), *Jane's Radar and Electronic Warfare Systems 1990-91*, pp.299, 424-5.

64 'Pakistan Updates Maritime Aircraft', p.24.

the frequency range of 2-18 GHz.<sup>65</sup> The two *Alamgir* (ex-US *Gearing*) destroyers have either the old AN/WLR-1 ESM system or the Phoenix II system.<sup>66</sup> The two *Shamsher* (ex-British *Leander*)-class frigates are equipped with Racal UA-8/9 radar intercept systems and Telefunken Telegon FH5 DF systems.<sup>67</sup> The four *Saif* (ex-US *Garcia*) class frigates and the four *Badr* (ex-US *Brooke*)-class frigates carry the AN/WLR-6 ESM system.<sup>68</sup> Pakistan has recently contracted with Thompson-CSF for six of the DR 3000S ship-borne ELINT/ESM system for installation aboard some of these frigates as well as the second-hand Type 21 (*Amazon*-class) frigates recently procured from Britain.<sup>69</sup>

Pakistan's six submarines (two *Hashmat*/French *Agosta* and four *Hangor*/French *Daphné* boats) are equipped with the ARUD radar intercept and warning system.<sup>70</sup> However, acquisition of the DR 3000U submarine version of the Thompson-CSF DR 3000 ELINT/ESM system is currently under consideration.<sup>71</sup>

### *The Afghanistan War*

SIGINT was the most reliable source of intelligence available to the Pakistani intelligence community during the Afghanistan war. It was provided by the re-established US station at Parachinar/Bada Bier, equipment supplied to the ISI by the Americans but operated by the ISI, and the ISI's own capabilities. According to Brigadier Mohammad Yousaf, it covered the following critical areas:

- The order of battle of Soviet forces in Afghanistan. SIGINT was used by ISI to identify particular Soviet military units in Afghanistan, their operating bases, command relationships with other units, their equipment, and the key personnel in the various units.<sup>72</sup>

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65 Sharpe (ed.), *Jane's Fighting Ships 1991-92*, p.426; and Blake (ed.), *Jane's Radar and Electronic Warfare Systems 1990-91*, p.394.

66 Sharpe (ed.), *Jane's Fighting Ships 1991-92*, p.427.

67 *ibid.*

68 *ibid.*, p.428.

69 'Pakistan Updates Maritime Aircraft', p.24.

70 Sharpe (ed.), *Jane's Fighting Ships 1991-92*, p.425.

71 'Pakistan Updates Maritime Aircraft', p.24.

72 Yousaf and Adkin, *The Bear Trap*, p.94.



## 58 *Signals Intelligence (SIGINT) in South Asia*

- Soviet casualties. For example, Brigadier Yousaf has written that 'my sources, which included intercepted enemy radio transmissions, indicated Soviet losses in 1984 of between 4,000-5,000 killed or wounded, with their Afghan allies suffering some 20,000 casualties, including defections'.<sup>73</sup>
- Coverage of military engagements and veracity of Mujahideen reports. SIGINT provided comprehensive monitoring of Soviet and Afghan signal nets, and gave the ISI 'high-grade tactical information on the movement of units, and sometimes their intention', access to operational orders and other signals transmitted during the course of particular military operations, and 'feedback on the success or otherwise of some of our Mujahideen attacks in terms of damage caused or casualties inflicted'.<sup>74</sup> Brigadier Yousaf has written, with respect to this last point, that he 'was indebted to the radio interception service which often provided me with confirmation of activities claimed by [Mujahideen] Commanders and Parties'.<sup>75</sup>
- Counter-espionage operations. For example, in 1985, intercepted radio signals showed that a Commander Asmat, who operated in the area between Chaman and Kandahar with the support of the Pakistani Army's Intelligence Directorate, was really working for the Soviet KGB and the Khidamate Aetilaati Daulati (KHAD), the Afghani security and intelligence organisation.<sup>76</sup>

### *The CDAA/Celtic Circus HF DF System*

The most advanced SIGINT system that the CIA gave the ISI during the Afghanistan War was a network of three *Pusher*-type circularly disposed antenna arrays (CDAAs), designed to intercept and provide DF bearings on HF communications. In October 1993, the master station, located just north of Karachi, was destroyed in a major earthquake. In 1994-95, the CDAA network (including the reconstructed Karachi master station) was significantly enhanced by

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<sup>73</sup> *ibid.*, p.128.

<sup>74</sup> *ibid.*, p.94.

<sup>75</sup> *ibid.*, p.104.

<sup>76</sup> *ibid.*, p.130.

the installation of the *Celtic Circus* HF DF system. Produced by AWA Defence Industries in Elizabeth, South Australia, the *Celtic Circus* system covers the 0.5 to 30 MHz frequency band, has a DF rate of 40 signals per second, including signals with bursts as short as 50 milliseconds, and produces bearings on HF groundwaves with an operational accuracy of 0.5° RMS out to 80-100 km and on HF skywaves of 1.5° RMS out to ranges beyond 3000 km.<sup>77</sup>

## Conclusion

Given the resources available, Pakistan's SIGINT activities must be reckoned to be reasonably cost-effective. In comparison, for example, India's SIGINT establishment is several times larger in terms of personnel and resources, but at the points where comparative assessments of their respective SIGINT capabilities are meaningful, the performance of the Pakistani SIGINT establishment has been at least as good. At the strategic level, Pakistan's SIGINT facilities have provided extremely valuable intelligence concerning diplomatic and military activities in Russia, Afghanistan, Iran and India. At the operational and tactical levels, SIGINT provided by Pakistani military SIGINT units contributed significantly to the effectiveness of Pakistani operations during the wars with India - and especially the first (1947-48) and second (1965) wars, when the Pakistani military was better positioned to utilise the intelligence. Pakistan has also developed a capable ocean surveillance information system, involving ground stations as well as airborne and ship-based systems.

It is fairly clear that, when Pakistan and India achieved their independence in August 1947, it was Pakistan which inherited most of the legacy of the long and substantial British SIGINT experience in South Asia. Over the four decades to 1947, the stations at Abbottabad and Cherat and elsewhere along the North-West Frontier were generally more important than those located in India itself. During the Second World War, the Wireless Experimental Centre in New Delhi was the pre-eminent SIGINT station in South Asia, but the WEC, together with most of the other wartime SIGINT stations in India, involved large numbers of Muslims who subsequently emigrated to

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<sup>77</sup> 'Celtic HF/DF Systems' in Bernard Blake (ed.), *Jane's Radar and Electronic Warfare Systems, 1995-96* (Jane's Information Group Limited, Coulsdon, Surrey, 7th edn 1995), p.401.

## 60 *Signals Intelligence (SIGINT) in South Asia*

Pakistan. During the war, the two principal SIGINT training centres in the South Asian theatre were at Abbottabad and Quetta;<sup>78</sup> most of the indigenes involved in the activities at these stations remained in Pakistan. There is no doubt that when the first India-Pakistan war broke out in October 1947, only two months after independence, Pakistan was the first to reconstitute a viable and effective SIGINT capability.

It is clear that, overall, Pakistan's SIGINT operations are subject to better coordination and management than India's. Instead of a plethora of organisations, SIGINT in Pakistan is principally the responsibility of a single agency - the Inter-Services Intelligence Directorate, which is both responsible for SIGINT activities at the national and strategic levels, and the oversight and coordination of SIGINT activities at the service, operational and tactical levels.

Pakistan's geographic location in South Asia, bordering India, China, Afghanistan and Iran, and close to the southern border of the former Soviet Union, is also advantageous for SIGINT collection. Investment in only a handful of well-placed sites (for example, Peshawar, Quetta, Karachi and a site in Baluchistan) would provide comprehensive coverage of strategic communications throughout Central/South Asia. The area from Parachinar/Bada Bier/Peshawar across to Abbottabad has proven to be extremely lucrative for SIGINT operations over many decades. Stations in Karachi and/or along the Makran/Baluchistan coast would provide good coverage of maritime traffic across the Arabian Sea and western Indian Ocean.

On the other hand, Pakistan's SIGINT establishment is also beset with major problems. To begin with, it has been too heavily dependent upon the vagaries of the US relationship, especially at the strategic level but also at the operational and tactical levels. Major SIGINT activities, such as those at Peshawar/Bada Bier and, in the 1980s, Parachinar, have been hostage to the general state of political relations between Pakistan and the United States. More recently, over the past several years, Pakistan has been denied access to advanced US defence systems, including those (such as the three P-3 *Orions* which

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<sup>78</sup> Skillen, *Spies of the Airwaves*, pp.517, 520.



the Pakistani Navy has already paid for but delivery of which has been embargoed by the United States)<sup>79</sup> involving ELINT/EW capabilities.

Second, the Pakistani SIGINT establishment is heavily politicised. In terms of the effectiveness and efficiency of SIGINT operations, the value of a centralised oversight, management and coordination structure which is provided by the ISI - down through the Joint Services Intelligence Bureau and the Inter-Services Signals Units to the intercept detachments, and encompassing virtually all Pakistani SIGINT activities - cannot be gainsaid. The problem is that the ISI is a powerful and committed political actor. The activities of the ISI, in addition to SIGINT operations, include the conduct of covert operations, internal security activities, and operations against domestic political opponents. The Director-General of ISI has, in the case of most incumbents, been one of the most powerful men in the Pakistani military.<sup>80</sup>

The Directorate has frequently pursued its own (or the army's) agenda, both externally and domestically. Externally, the ISI has fuelled the militant movement in Kashmir and hence dictated Pakistani policy towards Kashmir and India more generally; in Afghanistan, it has supported the more fundamentalist Mujahideen groups rather than a broader based coalition.<sup>81</sup> Domestically, the ISI has organised and financed particular political parties opposed to the Pakistan People's Party (PPP) and conducted destabilisation operations against PPP governments.<sup>82</sup> Since the death of President Zia ul-Haq in August 1988, Prime Ministers Benazir Bhutto and Nawaz Sharif have attempted to assert their authority over the ISI by appointing directors-general of their own choice - with four incumbents in the past six years, or an average of 18 months in office for each incumbent.<sup>83</sup> The consequences of resources and effort being diverted to domestic monitoring, of unproductive tensions between

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79 'Pakistan: Orion Export on Hold', *Jane's Defence Weekly*, 9 May 1992, p.805.

80 Yousaf and Adkin, *The Bear Trap*, p.1; and Ahmed Rashid, 'Showing Her Steel: Bhutto Asserts Control by Sacking Intelligence Chief', *Far Eastern Economic Review*, 8 June 1989, p.35.

81 *ibid.*

82 Salamat Ali, 'Tarnished Brass: Scandal Over Soldiers Playing Politics', *Far Eastern Economic Review*, 15 October 1992, p.12.

83 Rashid, 'Showing Her Steel', p.35; 'Pakistan Replaces Army Intelligence Chief', *Washington Times*, 3 March 1992, p.2; and 'Changing Spies', *The Economist*, Vol. 322, No.7749, 7 March 1992, p.28.

62 *Signals Intelligence (SIGINT) in South Asia*

the ISI and the government, and of the disruptions caused by the frequent change of director-general, are not difficult to appreciate.

Resources have been squandered on the sorts of technical operations that authoritarian regimes generally find attractive - for example, monitoring the telephone conversations and the telex and fax messages of journalists<sup>84</sup> - rather than in the national interest. The ISI might be 'the most effective intelligence agency in the third world',<sup>85</sup> but until it accepts the norms of democratic government and objures interference in domestic politics, it will find that waste and disruption have subtracted greatly from the potential of the agency.

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84 See, for example, Kurt Lohbeck, *Holy War, Unholy Victory: Eyewitness to the CIA's Secret War in Afghanistan* (Regnery Gateway, Washington DC, 1993), p.114.

85 Yousaf and Adkin, *The Bear Trap*, p.1.

## CHAPTER 3

### SIGNALS INTELLIGENCE (SIGINT) IN SRI LANKA

Sri Lanka is a small island country, some 64,652 square kilometres in size, with a population of 17.6 million, a GNP of \$(US)9.7 billion, a defence budget of only \$(US)474 million, and total armed forces of some 110,800 personnel.

Sri Lanka's own SIGINT capabilities are quite rudimentary. However, its location at the tip of South Asia and mid-way across the Indian Ocean has made it an attractive site for SIGINT activities by other countries, such as Britain during the Second World War. In the early 1920s, the British Army's Royal Corps of Signals established a SIGINT unit in Ceylon.<sup>1</sup> In 1939, the Admiralty decided to establish a direction-finding station at Trincomalee, on the northeast coast, as part of its world-wide DF network.<sup>2</sup> During the Second World War, Ceylon was the site of important SIGINT activities concerning the Southeast Asian theatre.

Since the early 1980s, Sri Lanka has been beset by civil insurgency. The most intractable and violent conflict has involved Tamil militants in northeast Ceylon, and more particularly the Liberation Tigers of Tamil Eelam and, from 1987 to 1991, the deployment to Sri Lanka of an Indian Peace-Keeping Force to combat the insurgents. There was very extensive SIGINT activity during this period, conducted by Sri Lankan and Indian defence, security and police agencies as well as the LTTE itself. The SIGINT capabilities are rudimentary, but against unsophisticated radio communication systems and poor communications security (COMSEC) practices they have recorded some notable achievements - including the eventual destruction of the LTTE's communications network. It is an interesting study of the role of SIGINT in counter-insurgency warfare.

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<sup>1</sup> West, *GCHQ: The Secret Wireless War, 1900-86*, pp.75-6.

<sup>2</sup> 'D/F Stations Building or Projected', Memo from the Secretary of the Admiralty, London, to the Secretary of Naval Office, Melbourne, 1 February 1940.



### **SIGINT Operations in Ceylon during the Second World War**

There were four important sites of SIGINT operations in Ceylon during the Second World War - Colombo, Peradeniya, Trincomalee and Hambantota.

#### *HMS Anderson, Colombo*

The largest of these operations was at HMS *Anderson*, a naval shore station on the southeast outskirts of Colombo, which was primarily concerned with Japanese naval signals, and served as an outstation of the Japanese Naval Section of the British Government Code and Cypher School at Bletchley Park.<sup>3</sup>

Soon after the Japanese attack on Pearl Harbor on 7 December 1941, it was decided to relocate the Far East Combined Bureau (FECB), which was responsible for all British SIGINT and cryptanalytic activities in East and Southeast Asia, from Singapore to Ceylon. (It had previously been moved from Hong Kong to Singapore in August/September 1939.)<sup>4</sup> During the last week of December 1941 and the first week of January 1942, 'the staff at FECB ..., its Hollerith machines, and all its codebreaking records were safely evacuated from Singapore to Colombo ... where the unit became known as Captain on Staff HMS *Lanki*'.<sup>5</sup>

The intercept/decrypt operation in Colombo became operational within a few weeks. Although the British SIGINT authorities have been careful to declassify nothing whatsoever about the Colombo operation, a handful of intercept records has been released by the US authorities. These indicate that the station was operational at least by 13 February 1942. Intercepted through the ensuing two-week period, they show that the Colombo station was decrypting Japanese naval messages encrypted in the JN 25 code on a

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<sup>3</sup> Denham, 'Bedford-Bletchley-Kilindini-Colombo', pp.272-6.

<sup>4</sup> James Rusbridger and Eric Nave, *Betrayal at Pearl Harbor: How Churchill Lured Roosevelt into World War II* (Summit Books, New York, 1991), p.91.

<sup>5</sup> *ibid.*, p.161.

**Figure 3.1: SIGINT Stations in Ceylon, 1940-45**

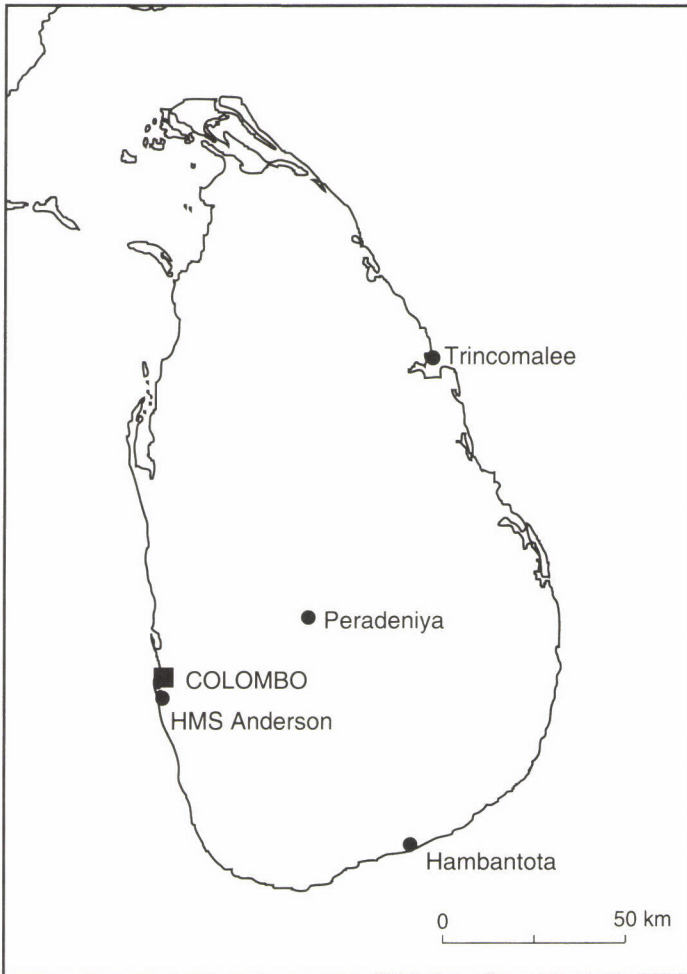






Figure 3.3: Evaluation of FECB from Singapore to Colombo, Admiralty Message, 27 April 1942

NAVY OFFICE—COPY OF MESSAGE

STP/MP- ADMIRALTY 168. M.Z.H.B. A.C.N.B. B.A.D. WASHINGTON.  
 TO..... C.IN C, 6TH. ATLANTIC C. IN C. E. FLEET. 182 F.O.C. R.I.N.  
 FOR ARM INDIA. C. IN C. CEYLON

DEPUTY C. IN C. E. FLEET. N. CYPHER (FLAG)

FROM W/T. DATE 27/4/42. DATE REC'D T.O.O. 0506Z/27.

METHOD OF TRANSMISSION W/T. DATE SENT DATE REC'D

**SECRET.**

PRESENT LOCATION OF NAVAL INTELLIGENCE STAFF EX P.E.C.B. IS AS FOLLOWS (11) COLOMBO HALF SPECIAL INTELLIGENCE AND 'Y' ORGANIZATION AND (9) NAVAL O I C PERSONNEL ADMINISTERED BY C. IN C. CEYLON. ZYMOTIC AND Y SIGNALS WILL CONTINUE TO BE ORIGINATED BY CAPTAIN SUPERINTENDENT COLOMBO (11) GENERAL MESSAGES (9) TO KILINDINI. OTHER HALF OF SPECIAL INTELLIGENCE AND Y ORGANIZATION INCLUDING SHAW AND FRANCIS WITH NUCLEUS SECRETARIAT AND CYPHER STAFF. AFTER ESTABLISHMENT MAY ORIGINATE ZYMOTIC AND Y SIGNALS AS FROM CAPTAIN SUPERINTENDENT KILINDINI. PERSONNEL REMAINING PART OF CAPTAIN SUPERINTENDENT ORGANIZATION AND AS SUCH PART OF C. IN C. E. FLEET STAFF 6 WILL BE ADMINISTERED LOCALLY BY FLAG OFFICER IN CHARGE KILINDINI (17) NEW DELHI. 4 OFFICERS WORKING WITH D M I INDIA TO DEAL WITH NAVAL ASPECTS JOINT INTELLIGENCE. P.O.C. R.I.N. IS REQUESTED DEAL WITH LOCAL ADMINISTRATION MATTERS THE OFFICERS REMAINING PART CAPT. SUPERINTENDENT ORGANIZATION AND C. IN C. E. FLEET STAFF (7) SIGNALS AND CORRESPONDENCE CAPT. SUPDT. SHOULD CONTINUE TO BE SENT COLOMBO) 3 FOR THE PRESENT AND REPEATED KILINDINI ONLY WHEN NECESSARY. NOMINAL LISTS NEW ARRANGEMENTS FOLLOW TO ADMIRALTY

Distribution: (FOR D.N.I.) ONLY.

1st. N.M.  
 2nd. N.M.  
 D.S.C.  
 D.N.I.  
 S.I.B.  
 H. OF N.  
 C. RECS.

regular basis. These messages concerned the movements of Japanese submarines, major surface combatants and convoys.<sup>6</sup>

By September 1943, 'the unit had become HMS *Anderson*, and was housed in a range of single-storey buildings on the southeast fringe of town'.<sup>7</sup> The activity at *Anderson* has been described as follows:

At first at Colombo the 'production' staff worked day and evenings, with a duty officer sleeping on the premises overnight. Then, at the beginning of March 1944, we went over to full 168-hours-a-week watchkeeping, including Christmas Day. The main party was the JN 25 one, handling 150-200 messages a day. Two further parties exploited JN 11 and JN 40. There were other activities on the station manned by naval staff with which we were less closely involved - including a unit under Lieutenant-Commander Colgrave which dealt with Japanese naval air codes. There were also the staff who studied Japanese communications - frequencies, schedules, call-signs, etc. - both to direct the intercept operators and to extract what intelligence the communications themselves provided. For instance, if you could identify the characteristics of individual enemy operators and transmitters, you could track the movement of ships and units. The technique was an advanced one in those days, and was concealed by the name of REB (said, obscurely, to stand for 'Radio Elimination of Bloodstains' but known elsewhere as RFP, 'Radio Finger-Printing'). This room was where some of us saw our first oscilloscope. Last, but not least, was the big Hollerith party, mainly staffed by Wrens.<sup>8</sup>

The contribution of HMS *Anderson* towards strategy and operations is very difficult to assess. As Hugh Denham has noted, those like himself who were engaged in the cryptanalytic activity were not privy to operational decisions.<sup>9</sup> Unlike the case with wartime German decrypts, the Japanese decrypts (except for a handful of

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6 *ibid.*, pp.186-92.

7 Denham, 'Bedford-Bletchley-Kilindini-Colombo', pp.272-3.

8 *ibid.*, p.273.

9 *ibid.*, p.274.

messages) have never been made public. Indeed, they may well have been incinerated following the Japanese surrender.<sup>10</sup>

On the other hand, it is clear that the Colombo station was able to read a wide range of encrypted Japanese naval signals, including those in JN11, JN23, JN25, and JN40 codes. JN25 was the main Japanese fleet code, which was used in about 70 per cent of Japanese naval communications. It was a five-digit recipherment system, involving codebooks and additives, with the additive tables being changed every few months, but was evidently being broken at Colombo without difficulty.<sup>11</sup> JN11 was 'a down-market version of JN25', using four-digit rather than five-digit code groups. According to Hugh Denham, 'the [JN11] system was regularly exploited'.<sup>12</sup> JN23 was a five-digit reciphered naval code devoted to the construction, launching and completion of new warships. The intercepts of JN11 signals were too faint to be reliably recorded at Colombo, but copies were forwarded from Washington for the Colombo cryptanalysts to break.<sup>13</sup> JN40 was a merchant-shipping cypher consisting of a substitution table and transposition keys. It could be read fairly 'promptly', and provided intelligence on convoys and logistic movements.<sup>14</sup>

Colombo was one of three major Allied SIGINT centres that worked on Japanese naval traffic - the others being the US Navy's OP-20G in Washington DC, and the Fleet Radio Unit, Melbourne (FRUMEL), in Australia. It must be accorded a substantial share of the credit for the successes to which SIGINT contributed in the naval war in the Pacific, though at the operational level its focus was on 'messages that affected the Indian Ocean'.<sup>15</sup>

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10 Rusbridger and Nave, *Betrayal at Pearl Harbor*, p.173.

11 *ibid.*, pp.173-4, 186-92; Stripp, *Codebreaker in the Far East*, pp.68-9; and Denham, 'Bedford-Blwetchley-Kilindindi-Colombo', pp.277-81.

12 Denham, 'Bedford-Bletchley-Kilindini-Colombo', p.277.

13 Stripp, *Codebreaker in the Far East*, p.68.

14 Denham, 'Bedford-Bletchley-Kilindini-Colombo', pp.279-81; and Stripp, *Codebreaker in the Far East*, p.270.

15 Denham, 'Bedford-Bletchley-Kilindini-Colombo', p.275.



70 Signals Intelligence (SIGINT) in South Asia

Figure 3.4: Colombo Intercept, 13 February 1942

~~SECRET~~ NAVAL MESSAGE T.O.C. 0707Z/13  
IN Received: 13/2/42  
Time: 1657

Addressed: Admiralty (For D.N.I.)  
Repeated: A.C.N.B.,  
N.Z.N.B.,  
ABDAFLOAT,  
B.A.D. Washington  
From: Capt. on Staff Colombo

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IMPORTANT

Naval Special Intelligence dated 12th  
February. C. in C. Combined Fleet transfers his  
flag to YAMATO at 0100Z/12th. Comment. No record of  
YAMATO. May be new battleship.

0707Z/13

S.O.

BMacP

Figure 3.5: Colombo Intercept, 26 February 1942

~~TOP SECRET~~ NAVAL MESSAGE T.O.O. 0623Z/26  
IN Received: 26/2/42  
Time : 0540

Addressed: S.O. China Force  
Repeated : Admiralty for D.N.I.  
B.A.D., Washington  
From : Captain on Staff, Colombo

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IMPORTANT  
LIDAC

ZYNOTIC. Naval Special Intelligence dated 25th. 10 transports for operation T for Tommy will leave Muntok vicinity 1200 Japanese time 26th. Further convoy of 10 ships will leave Palembang and an unknown place on 28th. Comment. Call signs believed to belong to Fourth Destroyer Squadron and an air unit are included in address.

S.C. China Force pass to C.Z.J.

0623Z/26

S.O.

FP





Figure 3.7: Colombo Intercept, 27 February 1942

<del>TOP SECRET</del>	NAVAL MESSAGE	T.O.O. 2025Z/27
	IN	Received: 27/2/42
		Time: 2130
Addressed:	C.C.C.F. Admiralty for D.N.I. B.A.D. Washington A.C.N.B.	
From:	Captain on Staff, Colombo	
<hr/>		
ZEALOUS.		
Plain language <del>and</del> special intelligence.		
After reporting five enemy destroyers off Bali at 1830Z 27th, unknown reconnaissance unit was ordered to keep watch near South Eastern end of Java and keep C. in C. 3rd Fleet informed of situation.		
2025Z/27		
E.O.		
D.M.T.		

**Figure 3.8: Colombo Intercept, 1 March 1942**

Naval Special Intelligence from Colombo dated March 1st.

An unknown force possibly which is hostile from DAWAO  
is to arrive ? at 5 degrees 15 minutes South? 108 degrees  
East at 0700? 3rd March. Speed 9 knots.

Rec'd 5 Mar.

Two particular operations in which the role of SIGINT produced at Colombo has been discussed are the Japanese attacks on Ceylon in April 1942 and the destruction of a Japanese naval force in the Andaman Sea in May 1945.

Decrypts provided timely warning of the Japanese raids on Colombo and Trincomalee in April 1942. According to Hugh Denham, in the case of the attack on Colombo:

[The cryptanalysts] were working one sultry afternoon in Colombo on a message that described plans for a massive attack somewhere. Then they spelt out the name of the place that was to be clobbered - KO-RO-N-BO; an electric shock ran through the up-to-then relaxed office. This decrypt enabled the Navy and the Air Force and Commander-in-Chief Ceylon to make preparations. Although we did not win the ensuing battle with the Japanese task force, the damage that we suffered was limited, and Nagumo came up against the first opposition that he had encountered in four victorious months.<sup>16</sup>

In the case of the Japanese attack on Trincomalee, the FECB SIGINT staff at *Anderson* was able to provide intelligence on the size, composition, movement and attack plans of the Japanese task force, but it could not make up for the disparity in capabilities - Vice Admiral Nagumo commanded five heavy cruisers, the carrier *Ryujō*, four destroyers, with about a hundred dive-bombers and forty fighter escort aircraft embarked, against an obsolete carrier (*Hermes*) with no serviceable aircraft, and a destroyer (*Vampire*) and a corvette, together with two tankers, which had been ported at Trincomalee. Virtually defenceless against air attack, they were ordered to clear the harbour. On the morning of 9 April, the Colombo station intercepted a signal from a Japanese reconnaissance floatplane informing Nagumo that it had sighted the *Hermes* and its companions, and although a warning was flashed to the carrier, nothing could be done to prevent the ensuing massacre.<sup>17</sup>

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<sup>16</sup> *ibid.*, pp.272-6.

<sup>17</sup> Edwyn Gray, *Operation Pacific: The Royal Navy's War against Japan, 1941-1945* (Leo Cooper, London, 1990), pp.121-2.

## 76 *Signals Intelligence (SIGINT) in South Asia*

In May 1945, *Ultra* decrypts provided the plans for the Japanese withdrawal from the Andaman and Nicobar Islands back to Singapore. This was used to good effect on 15-16 May when a British task force, this time outnumbering the Japanese, destroyed the Japanese convoy, sunk the cruiser *Haguro*, and effectively isolated the Andamans garrison.<sup>18</sup>

In mid-July 1945, Lord Mountbatten visited the cryptanalysts at *Anderson* and 'told us that we were worth ten divisions'.<sup>19</sup>

### *RAF SIGINT Units, HMS Anderson*

Following the disastrous loss of the *Repulse* and the *Prince of Wales* to Japanese bombers on 10 December 1941, it was decided to embark small RAF 'Y' sections on capital ships to give warning of Japanese air attacks. RAF Wireless Units (WUs) based at *HMS Anderson* provided the personnel for the 'Float' parties, such as 357 WU and 370 WU.<sup>20</sup>

As at June-October 1944, 357 WU had a total strength of 190 officers, senior NCOs and airmen, including 52 personnel attached from 370 WU, which was soon to be expanded and administratively separated from 357 WU. It 'was intended that 357 WU would have a semi-static role and 370 WU was to be completely mobile to move quickly', but 'both were expected to provide 'Y' Float parties to operate on ships of the Eastern Fleet'.<sup>21</sup> The first RAF 'Y' Float party served on *HMS Renown* during *Operation Millet* in October 1944. Although the party provided continuous coverage of the frequencies used by Japanese military and naval air units in the Nicobar area, and was able to give the bridge advance warning of the possibility of bombers approaching from the Japanese base at Port Blair, the exercise was 'practically valueless' because no radio telephony was intercepted and

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18 John Winton, *Sink the Haguro! The Last Destroyer Action of the Second World War* (Seeley, Service & Co. Ltd, London, 1978), pp.58-75, 86-7; Denham, 'Bedford-Bletchley-Kilindini-Colombo', p.275; Gray, *Operation Pacific*, pp.225-9; and Stripp, *Codebreaker in the Far East*, p.68.

19 Denham, 'Bedford-Bletchley-Kilindini-Colombo', p.275.

20 Hugh Skillen, 'MEACONS and M. Type W/T Sections' in Hugh Skillen (ed.), *The Enigma Symposium 1995* (Hugh Skillen, Pinner, Middlesex, 1995), p.68.

21 *ibid.*



the wireless telegraphy messages could not be read.<sup>22</sup> A party of eight officers and airmen from 357 and 370 WUs served on HMS *Illustrious* from 17-22 December, off the north coast of Sumatra, and monitored 'all [Japanese] air activity in the target area' while aircraft from HMS *Illustrious* and HMS *Indomitable* attacked Japanese installations on northeast Sumatra.<sup>23</sup> On 1-7 January, a party from 357 and 370 WUs served aboard HMS *Indomitable* and monitored Japanese air activity while other targets in northeast Sumatra were attacked.<sup>24</sup> Other 'Y' parties served on HMS *Indomitable* during Operation *Lentil*; and on HMS *Empress* during Operation *Stacey* in February 1945, when the 'Y' party supported a photo reconnaissance mission around Penang off the northwest coast of Malaya by providing 'tactical information of every air movement and intentions and general enemy awareness of and reaction to the situation'.<sup>25</sup>

#### *South East Asia Command (SEAC), Peradeniya*

The second important SIGINT site was at Peradeniya, near Kandy, in south-central Ceylon, which directly serviced Lord Louis Mountbatten's South East Asia Command and the subordinate air and ground headquarters for the theatre - Air Command South East Asia (ACSEA) and Allied Land Forces South East Asia (ALFSEA). The SIGINT station at Peradeniya operated as a joint or Allied activity, with close links with the Wireless Experimental Centre in New Delhi and Central Bureau in Brisbane.<sup>26</sup> It was primarily concerned with the compilation of order-of-battle intelligence from SIGINT produced by allied SIGINT activities elsewhere, and the dissemination of 'authoritative estimates of Japanese order of battle, dispositions, and capabilities' to the various theatre headquarters.<sup>27</sup>

The Wireless Experimental Centre was located on an isolated hill at Anand Parbat on the southwest outskirts of Delhi. On the one

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22 *ibid.*, pp.68-9.

23 *ibid.*, p.69.

24 *ibid.*

25 *ibid.*, p.70.

26 'Activities of Dr Marshall H. Stone, 9 April 1945' in Ronald H. Spector (ed.), *Listening to the Enemy: Key Documents on the Role of Communications Intelligence in the War with Japan* (Scholarly Resources Inc., Wilmington, Delaware, 1988), pp.139-41; and Ballard, *On Ultra Active Service*, p.298-301.

27 'Activities of Dr Marshall H. Stone, 9 April 1945', pp.139-41.

hand, the WEC operated as an outstation of GCCS at Bletchley Park, concentrating on Japanese Army and Air Force codes and cyphers. On the other hand, operational control was exercised through the Indian Wireless Intelligence Service (IWIS), in turn controlled by GHQ India in Delhi, and subordinate to Mountbatten's South East Asia Command at Kandy. The WEC served as the coordination centre for all British Army SIGINT activities in the India-Burma theatre, with two principal sub-centres - the Western Wireless Sub-Centre at Bangalore, and the Eastern Wireless Sub-Centre at Barrackpore near Calcutta - and more than a dozen other intercept and DF stations from Abbottabad in the North-West Frontier through Assam (for example, Tezpur, Shillong and Imphal) and Bengal (for example, Cox's Bazar and Comilla) to Monywa, Akyab (Sittwe) and other posts in Burma.<sup>28</sup> The network provided strategic and operational SIGINT to Lord Mountbatten's South East Asia Command, and operational and tactical SIGINT directly to field commanders in eastern India and Burma. In July 1943, a new radio station was installed at the WEC to link up the Special Communications Units (SCUs) 'stretching from London to Delhi with Mountbatten's Signal HQ in Colombo and [Central Bureau in] Australia so that, for example, BP [Bletchley Park] could receive Japanese cyphers from the office of the Commander-in-Chief, South-East Asia and for a two-way traffic in cyphers and decrypted intelligence'.<sup>29</sup>

The SIGINT activities at Peradeniya involved a Special Liaison Unit (SLU) responsible for the dissemination of *Ultra* SIGINT from GCCS at Bletchley and the WEC in New Delhi to Lord Mountbatten and his senior commanders; US Special Security Officers (SSOs) responsible for SIGINT received from the War Department in Washington; and a 'joint "SIGINT" team' which at the very end of the War included a SIGINT Liaison Officer from Central Bureau in Brisbane to coordinate and expedite the exchange of SIGINT between the South West Pacific Area and the South East Asia Command.

In October 1944, F.W. Winterbotham, who had been responsible for establishing the SLU at Peradeniya, visited the unit to assess its efficacy and ensure that Lord Mountbatten and his SEAC

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28 Desmond Ball, 'Signals Intelligence in India', *Intelligence and National Security*, Vol.10, No.3, July 1995, pp.377-9.  
29 Skillen, *Spies of the Airwaves*, p.515.

were receiving, in the highest security, all the *Ultra* SIGINT material that might concern them. He has recounted a situation whereby coordination of SIGINT material was quite deficient and which was only rectified in a roundabout manner:

It was not until I got to Kandy that I had first met Captain Inzer Wyatt. He belonged to the United States Special Security and had been learning the *Ultra* business at Bletchley. Inzer's job was to look after the *Ultra* needs of Generals Stilwell and Chennault, who commanded the United States Army and Air Forces operating with Chiang Kai-shek in South China. Inzer was a welcome addition to the SLU set-up, more especially as he was able to get Japanese army and air signals relayed direct from Washington.

He and John Stripe soon became firm friends and their close co-operation enabled me to sort out a rather bizarre situation.

John was getting Japanese army and air signals both from Bletchley and Brisbane, but he was not getting the Japanese naval information which contained valuable intelligence about Japanese supply convoys that operated around the Dutch East Indies; this was of the utmost interest to South-East Asia Command and Slim. The Japanese naval signals concerning these convoys did, however, reach London and British Naval Headquarters, Colombo, from Washington. Inzer Wyatt, for his part, was getting Japanese army and air signals direct from Washington, which he duly passed to Stilwell and Chenault, but he, too, was not given Japanese naval *Ultra*, which meant that the United States bomber force in Kunming had no information regarding the Japanese convoys. It seemed to be the same old story. I was able to make arrangements with London that Japanese naval *Ultra* dealing with convoy and supply traffic should now be made available to the SLU at Kandy, where John could also give it to Inzer who, in turn, was able to send it on to Chenault in China. It was rather a roundabout way of doing things, but it worked, and I believe Chenault had considerable success with his aircraft against



## 80 *Signals Intelligence (SIGINT) in South Asia*

these coastal convoys which so vitally affected the Japanese supply position in our Burma campaign.<sup>30</sup>

The Central Bureau SIGINT Liaison Officer at Peradeniya in July/August 1945 was Major Geoffrey Ballard, who has described the SIGINT material received from Brisbane as follows:

Of particular interest to the South East Asia Command was intelligence on the Japanese withdrawal westward through the NEI [Netherlands East Indies], High Command order of battle information concerning Singapore and Indochina, and information on Japanese air strength throughout the area.<sup>31</sup>

### *DF Stations*

HMS *Anderson* also served as a DF station for the Royal Navy.<sup>32</sup>

The third station was at Powder Island, just south-west of Trincomalee, on the northeast coast of Ceylon. It was equipped with both HF and MF DF facilities.<sup>33</sup> The fourth site was at Hambantota, which served as a DF station.<sup>34</sup>

Some of the cryptanalysts who worked at *Anderson* or Peradeniya during the Second World War later became prominent figures in the British Commonwealth postwar SIGINT organisation. For example, Commander J.E. Poulden, who served at *Anderson* in 1944-45, became the first Director of Australia's postwar SIGINT organisation, the Defence Signals Bureau (DSB), on 1 April 1947.<sup>35</sup> Lt Col John Rendle, British Army, who headed the 'joint SIGINT team' at Peradeniya at the end of the war,<sup>36</sup> became the Senior British Officer and the Special Assistant to the Director of the Defence Signals Bureau when Poulden left Australia in April 1950.

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30 F.W. Winterbotham, *The Ultra Secret* (Future Publications, London, 1975), pp.205-6.

31 Ballard, *On Ultra Active Service*, p.300.

32 *Radio Warfare*, Technical Staff Monographs 1939-1945 (Signal Division, Admiralty, 1949), Diagrams 1 and 2.

33 *ibid.*, Diagram 1; and 'D/F Stations Building or Projected', Memo from the Secretary of the Admiralty, London, to the Secretary of Naval Office, Melbourne, 1 February 1940.

34 *Radio Warfare*, Diagram 2.

35 'Obituaries: Lt-Cdr Teddy Poulden', *Daily Telegraph* (London), 20 November 1992, p.23.

36 Ballard, *On Ultra Active Service*, p.299.



### Postwar British SIGINT Activities

Britain re-established major SIGINT activities in Ceylon in the late 1940s, as part of the world-wide arrangements which the United States and the United Kingdom were implementing for the conduct of postwar SIGINT operations (the UKUSA arrangements). In about July 1947, for example, a SIGINT unit - which had served as 131 Special Wireless Section and then the Hong Kong Special Wireless Centre in Hong Kong, and then 800 Special Intelligence Company in Singapore - was established at HMS *Anderson*.<sup>37</sup>

### The Tamil Insurgency and Operation *Pawan*

During the period of most active Tamil insurgency in Sri Lanka, when the Indian Peace-Keeping Force was deployed to the northern part of the country (1987-91), radio was used extensively by all combatant elements and interested intelligence agencies, generally with poor communications security equipment and practices, and more than half-a-dozen parties conducted SIGINT operations, including signal interception and cryptanalytic activities. Much of the signals activity involved simple systems, such as walkie-talkies and citizens' band (CB) radios; it was monitored by equally simple receiver systems.

### *Insurgent Signals*

During the 1980s, there were more than three dozen militant Tamil groups, the most important of which were the Liberation Tigers of Tamil Eelam (LTTE), the People's Liberation Organisation of Tamil Eelam (PLOTE), the Tamil Eelam Liberation Organisation (TELO), the Eelam People's Revolutionary Liberation Front (EPRLF), and the Tamil Revolutionary Organisation of Students (EROS). The Sinhala Marxist Party/Janatha Vimukthi Peramuna (JVP) also engaged in armed activities. All of these organisations made extensive use of radio and telecommunications, involving fixed HF transmission/reception facilities, walkie-talkies, CB radios, and public telephone and telegraphy systems.

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<sup>37</sup> John Riggell and Arthur Bates, '10 SWS/131 SWS/Hong Kong Centre' in Hugh Skillen (ed.), *The Enigma Symposium 1995* (Hugh Skillen, Pinner, Middlesex, 1995), pp.42-52.

### *The LTTE Command, Control and Communications System*

The largest and most active of the Tamil insurgent groups has been, since about 1985, the Liberation Tigers of Tamil Eelam, the headquarters and command centre of which was located opposite the Jaffna University in Jaffna, at the northern tip of Sri Lanka.<sup>38</sup> The LTTE possessed an extensive array of communications systems, much of which was vulnerable to exploitation.

At the height of its power, the LTTE's Communications Centre was located near Thanjavur, in Tamil Nadu State in southeastern India, and just 140 km north-west of Jaffna.<sup>39</sup> Another important LTTE communications station, equipped with 'high powered transmitters' and 'interception' facilities, was located at Vedaranniyam,<sup>40</sup> on the extreme southeastern tip of India, just across the Palk Strait from Jaffna. Other communications centres were located at Nagappattinam in India, the LTTE's main military base near the Nallur Kovil on the northwest outskirts of Jaffna, and at the LTTE bases at Mannar, Kilinochchi, Mulativu, Vavuniya and Batticaloa in the north and east of Sri Lanka. These stations were in constant radio communication, using high-powered HF transmitters. The headquarters and command centre opposite Jaffna University and the military base near the Nallur Kovil 'functioned as centres of information and delegated work to all other points including training camps'.<sup>41</sup>

The LTTE's training and logistic support bases in Tamil Nadu in India were 'linked by a sophisticated wireless network'.<sup>42</sup> The bases were located at Madras, Coimbatore, Periyar (Erode), Salem, Dharmapuri, Atiruchi, Thanjavur, Pudukkottai, Madurai and Ramanathapuram.<sup>43</sup> Short-range FM radio was used to connect these bases to the HF trunk system.<sup>44</sup>

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38 Rohan Gunaratna, *Indian Intervention in Sri Lanka: The Role of India's Intelligence Agencies* (South Asian Network on Conflict Research, Colombo, 1993), pp.242-3.

39 *ibid.*, p.421.

40 *ibid.*, p.3.

41 Gunaratna, *War & Peace in Sri Lanka*, p.38.

42 Gunaratna, *Indian Intervention in Sri Lanka*, p.421.

43 *ibid.*

44 Deva, 'Communication Issues', pp.78-80.

Citizens' band radios and walkie-talkies were used for field communications.<sup>45</sup> For example, 'every area Commander and some of his trusted men were provided with Walkie-talkies, and were in constant touch with their main base [near the Nallur Kovil] and the headquarters in Jaffna'.<sup>46</sup>

LTTE communications were monitored by both Sri Lankan and Indian agencies.<sup>47</sup> The coverage included communications between LTTE bases in Sri Lanka and Tamil Nadu State and between LTTE bases and groups within Sri Lanka; and it included communications concerning logistic support, training, attack plans and battlefield operations.

### *The PLOTE Communications System*

The second most important Tamil militant group in the 1980s was the People's Liberation Organisation of Tamil Eelam, which had its 'coordinating headquarters' in Orthanadu in Tamil Nadu State.

The PLOTE Communication and Broadcasting HQ used 'a YASU-ICOMK 720 transmitter-receiver set installed on the top floor of a two-storeyed building situated about 600 yards from the Orthanadu junction in Tamil Nadu State'.<sup>48</sup> (Its call-sign was RBN.) The location of the facility 'puzzled Colombo for many years'.<sup>49</sup>

The other PLOTE communications stations were located near Mandapam, on the coast (call-sign SNA); Thiruthurapundi (SLM), near Thanjavur; in Madras (DIS); Jaffna (ATC); Vavuniya (VPK); Mannar (APA); and Batticaloa (GLN).<sup>50</sup>

All broadcasts were relayed on 17.2 MHz and 69.00 MHz in the 41 and 49 metre bands. Encrypted messages were transmitted in the 6-7 MHz band. The codes were changed every fortnight.<sup>51</sup>

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45 Gunaratna, *War & Peace in Sri Lanka*, p.38.

46 *ibid.*

47 Gunaratna, *Indian Intervention in Sri Lanka*, p.300; and Gunaratna, *War & Peace in Sri Lanka*, p.38.

48 Gunaratna, *War & Peace in Sri Lanka*, pp.156-7.

49 *ibid.*, p.156.

50 *ibid.*, p.157.

51 *ibid.*



### *Sri Lankan SIGINT Activities*

Both Sri Lankan defence and security agencies monitored LTTE command and tactical communications. These agencies included the Sri Lankan Directorate of Military Intelligence (DMI) and the National Intelligence Bureau (NIB), which operates under the general direction of and supervision of the Office of the Director-General of Intelligence and Security in the Ministry of Defence, as well as the Criminal Investigations Department.

For example, in November 1983, 'Sri Lankan defence sources began to monitor the Eelam radio' from a station in Colombo, but they were unable to locate the source of the transmissions.<sup>52</sup> In March 1988, 'Sri Lanka Intelligence' intercepted LTTE communications concerning plans for an LTTE attack on the village of Morawewa.<sup>53</sup> And on 2 March 1991, 'Sri Lankan security forces' monitored LTTE communications concerning a car bombing which killed the Minister for Defence, Ranjan Wijeratne, in Colombo. According to 'a security official':

An apparently elated LTTE voice was clearly heard over the intercepted broadcast as saying the LTTE had more than accomplished its purpose by leaving the scene of the bomb explosion without any clues.<sup>54</sup>

The Signal Corps of the Sri Lankan Army has been progressively modernised. The 2nd Division, with its headquarters in Anuradhapura in north-central Sri Lanka, has two signals regiments; the other two Divisions each has one signals regiment. These regiments are equipped with modern signals systems and electronic surveillance equipment.<sup>55</sup>

There was some cooperation and exchange between the Sri Lankan and Indian agencies. For example, 'when the LTTE was planning to strike the Morawewa village on March 3, 1988, Sri Lanka Intelligence had intercepted LTTE communications and passed this information to the IPKF'.<sup>56</sup>

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52 Gunaratna, *Indian Intervention in Sri Lanka*, p.98.

53 *ibid.*, p.268.

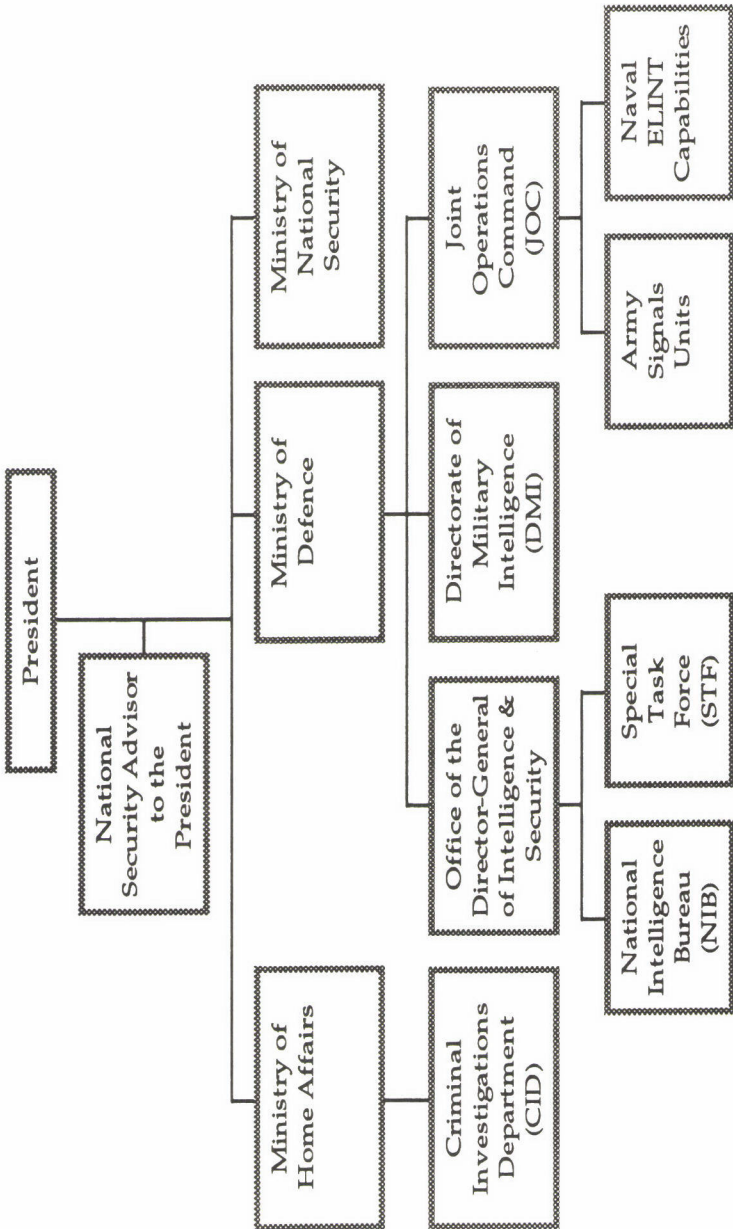
54 *ibid.*, p.457.

55 Rohan Gunasekara, 'The Sri Lanka Army Reshapes for War on Two Fronts', *International Defense Review*, June 1990, p.657.

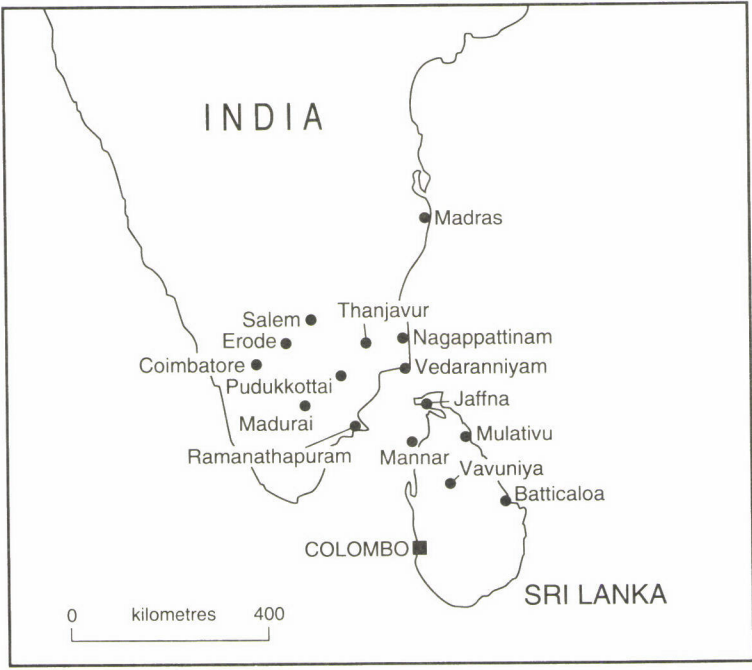
56 Gunaratna, *Indian Intervention in Sri Lanka*, p.268.



Figure 3.9: Sri Lanka's Security and Intelligence Structure



**Figure 3.10: Insurgent Signals and SIGINT Sites, 1987-91**



### **Indian SIGINT Activities**

At least five Indian agencies also monitored LTTE communications - the Electronic Technical Section of the Research and Analysis Wing of the Cabinet Secretariat in New Delhi; the Intelligence Bureau of the Ministry of Home Affairs; the Signals Intelligence Directorate of the Military Intelligence Directorate of the Indian Army; army signals units serving with the Indian Peace-Keeping Force in Sri Lanka; and Q Branch of the Tamil Nadu Police in Madras.

In Tamil Nadu State, for example, both Indian Central (RAW, SID and IB) and State (Q Branch of the Tamil Nadu Police) agencies monitored LTTE communications, until these were closed (temporarily) at the order of the Tamil Nadu Chief Minister, M.G. Ramachandran, in November 1986. As K. Mohandas, the Deputy Inspector General of Police (Intelligence), Tamil Nadu, has recounted:

Apparently angry at the outcome of the Bangalore talks, MGR [Ramachandran] asked me to seize the wireless sets which the militants were clandestinely using for communication with Sri Lanka. I told him that this was not necessary, because the Central and State Intelligence agencies were monitoring the traffic over the wireless. If the wireless sets were to be seized and put out of action, the intelligence agencies would be deprived of a reliable source that would furnish information about the intentions and activities of the militants. But MGR was insistent, and the sets were seized without any resistance.<sup>57</sup>

### **Indian Peace-Keeping Force (IPKF) Operations**

SIGINT activities were an important element of the Indian peace-keeping operations (Operation *Pawan*) in Sri Lanka in 1987-91. When the Indian Peace-Keeping Force arrived in Sri Lanka, it found that the Liberation Tigers of Tamil Eelam possessed an extensive array of communications systems, much of which was vulnerable to exploitation. This array included the fixed HF trunk system located in Tamil Nadu State and at remote places along the eastern coastline of Sri Lanka; the FM radio sets used to connect the LTTE's support bases

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<sup>57</sup> K. Mohandas, *MGR: The Man and the Myth* (Panther Publishers, Bangalore, 1992), pp.156-7.

## 88 *Signals Intelligence (SIGINT) in South Asia*

with its logistical and communication nodes; and CB radios and walkie-talkies used for field communications. The IPKF initiated a 'spectral surveillance' programme which proved extremely productive.<sup>58</sup>

An overall perspective of the value of SIGINT to the IPKF has been provided by Lt Gen Depinder Singh, who served as Overall Force Commander (OFC) of the IPKF (located at Madras) from July 1987 to February 1988:

Very valuable intelligence was procured by Signal Intelligence. The LTTE radio telephony procedure was excellent and though they were adept at short, sharp transmissions interspersed with code words or an improvised code (e.g., 'tell your cousin to meet me where we met day before') we would tape record the transmissions for translation and analysis. [Velupillai] Prabhakaran [commander of the LTTE] was generally referred to as 'Big Brother'. I used to stress the need for formation HQ, even units, to intercept LTTE transmission and make use of whatever useful information could be gleaned.<sup>59</sup>

According to Major General Yashwant Deva, who served as Chief Signal Officer, Southern Command, and who was responsible for setting up the IPKF communications system in Sri Lanka, 'in Operation Pawan, 90 per cent of the tactical intelligence was gained through COMINT'.<sup>60</sup>

SIGINT obtained by the IPKF covered the following critical areas:

- *Security intelligence*

Monitoring of the radio communications of the principal insurgent groups (such as the LTTE, PLOTE and the JVP) provided extensive security intelligence concerning these groups - including their command structures, their bases and facilities, unit strengths, relative propensities to violence, and responsibilities for particular

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58 Deva, 'Communication Issues', pp.78-80. See also Gunaratna, *War & Peace in Sri Lanka*, p.38.

59 Lieutenant General Depinder Singh, *The IPKF in Sri Lanka* (Trishul Publications, New Delhi, 1992), pp.155-6.

60 Deva, 'Communication Issues', p.79.



guerrilla or terrorist activities. For example, radio intercepts confirmed that the JVP, rather than the LTTE, was responsible for an attack on an IPKF patrol in the Trincomalee District in early 1989.<sup>61</sup>

- *LTTE strategic/political planning*

Radio monitoring provided valuable intelligence concerning the political and strategic intentions, plans and preparations of the LTTE. During the third quarter of 1988, for example, when an important round of surrender negotiations was being completed between the Sri Lankan government and the LTTE (and which provided for the total disarmament of the LTTE), intercepts of 'LTTE wireless communications' revealed LTTE plans for burying weapons (oiled and greased and placed in polythene bags) for recovery.<sup>62</sup>

- *Operational planning*

Monitoring of LTTE radio communications frequently provided the IPKF with indications and warning of LTTE operations, as plans and preparations were often reported and discussed on radio nets. According to Lt Gen S.C. Sardeshpande, who commanded the IPKF in Sri Lanka from January 1988 to March 1990, an 'increase in the logistic net traffic indicated preparation and imminence of military operations, as well as its general area', whereas an 'increase of traffic on the training net ... indicated a lull in military activity'.<sup>63</sup>

- *The order of battle of the LTTE units*

The IPKF used radio monitoring and DF activities to obtain a detailed picture of the OB of the LTTE - including the structure of the command hierarchy and the communications networks, and the locations of command centres, headquarters, bases and facilities, and operational units. As Lt Gen Sardeshpande has reported:

Large-scale use of radio communications by the LTTE enabled us to listen in to their conversations, identify their voice signatures, radio nets, purpose and general locations and areas of activity. That gave us a fairly good assessment of the

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61 Gunaratna, *Indian Intervention in Sri Lanka*, p.318.

62 *ibid.*, p.353.

63 Lt Gen S.C. Sardeshpande, *Assignment Jaffna* (Lancer Publishers, New Delhi, 1992), pp.10-11.

## 90 *Signals Intelligence (SIGINT) in South Asia*

militants strength, areas of operations, types of activity, leaders in terms of who-is-who and who-does-what.<sup>64</sup>

- *The location of LTTE units*

Radio monitoring and DF activities provided the IPKF with good intelligence on the locations of various LTTE field units, although the IPKF did find that much of its Soviet-supplied DF equipment was inadequate. As Lt Gen Depinder Singh has reported:

The volume of traffic from particular areas, which it is possible to pin point, was a good indication as regards location of various leaders and groups.<sup>65</sup>

However, as Lt Gen Singh also reported:

We need better Direction-Finding Equipment to more easily locate hostile transmitters. Tamil militant radio sets were fairly active from Tamil Nadu, especially along the coast, but we just could not locate the exact spot.<sup>66</sup>

- *Leadership location and negation*

Radio monitoring and DF activities often enabled the IPKF to follow the movements of the key LTTE leaders, such as Velupillai Prabhakaran and Kopalasamy Mahendrarajah (alias Ajit Mahattaya), and to locate their positions with some precision. On at least one occasion, this intelligence was used in an abortive attempt to capture or kill Prabhakaran. As Lt Gen Depinder Singh has recounted:

On one occasion an intercept indicated that Prabhakaran was located in Mulai, a village on the West coast of the Jaffna Peninsula. A raid was mounted by landing Para Commando's from the sea. They made rapid progress till they were fired at .... The whole patrol got involved in the desultory firing, giving Prabhakaran ... a chance to escape.<sup>67</sup>

(On 11-12 October 1987, when the IPKF mounted a Para Commando raid to capture Prabhakaran at his residence in central Jaffna, the LTTE had monitored IPKF radio transmissions concerning

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64 *ibid.*, p.10.

65 Singh, *The IPKF in Sri Lanka*, p.156.

66 *ibid.*

67 *ibid.*, p.125.

the operation and laid an ambush for the Indian force; Prabhakaran 'left the scene two hours before the Indians landed'.<sup>68</sup>

- *Interdiction of logistic movements*

In January 1988, 'IPKF signals intercepted a radio message between LTTE HQ [in Jaffna] and a station in or around Madras', which led to the discovery and confiscation of a van containing arms, ammunition, explosives and radio sets prepared for shipment to Jaffna.<sup>69</sup>

- *Battlefield reports*

Monitoring of LTTE radio communications during actual military engagements sometimes provided the IPKF with a real-time picture of military events and immediate assessments of tactical developments. As Lt Gen Sardeshpande has stated:

Chronologically arranged intercepts of the LTTE's radio transmissions would produce a fairly accurate picture of the action, complete with movements of its groups and more importantly, casualties suffered by its cadres and leaders.<sup>70</sup>

An instance of monitoring of a particular tactical movement during the course of a battle occurred during the battle for Jaffna on 21 October 1987, when the IPKF intercepted a radio transmission in which Kopalasamy Mahendrarajah, the second-in-command of the LTTE, ordered 'additional LTTE mortars to move to the [Jaffna General] Hospital as they will be safe there'.<sup>71</sup>

Monitoring of LTTE radio transmissions during a battle sometimes provided a picture of its course in terms of the relative successes of the IPKF and LTTE units engaged. For example, Lt Gen Depinder Singh has recounted how on 12 October, when IPKF Para Commandos mounted the raid on the LTTE's command centre that initiated the battle for Jaffna, monitoring of LTTE communications nets revealed the degree of success of the IPKF attack:

That they achieved a modicum of success can be gauged from a radio intercept wherein Prabhakaran informed all LTTE

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68 Gunaratna, *Indian Intervention in Sri Lanka*, pp.242-3.

69 Singh, *The IPKF in Sri Lanka*, pp.129-30.

70 Sardeshpande, *Assignment Jaffna*, p.34.

71 Singh, *The IPKF in Sri Lanka*, p.106.



stations that the headquarters was under attack and he may not escape.<sup>72</sup>

- *LTTE casualties*

Monitoring of LTTE radio communications during and immediately following actual military engagements provided the IPKF with its best source of intelligence on LTTE casualties. As Lt Gen Depinder Singh has recounted, IPKF estimates of LTTE casualties were 'cross checked by monitoring LTTE nets and noting the figures (and names in some cases) they gave'.<sup>73</sup>

- *Logistic deficiencies*

Monitoring of LTTE radio communications provided extensive intelligence concerning LTTE logistic activities and problems, which in turn provided operational intelligence for the IPKF.

Following the capture of Jaffna by the IPKF in October 1987, radio intercepts provided a good picture of the condition of the routed LTTE forces. As Lt Gen Depinder Singh has recounted:

Immediately after Jaffna was secured, radio intercepts of LTTE groups indicated critical shortage of ammunition, supplies and medicines. There were constant complaints [about shortages of food and medicines] ....

Initially, there were numerous radio intercepts of LTTE transmissions indicating that there was no ammunition, no food, no medicines and even no respite.<sup>74</sup>

- *Monitoring LTTE reporting on IPKF movements*

LTTE observation posts generally reported the movements of IPKF units over the LTTE communications nets, the monitoring of which provided the IPKF headquarters with useful confirmatory intelligence concerning the particular whereabouts of its own units. As Lt Gen Depinder Singh has stated:

The exact location of an IPKF patrol could be discovered by monitoring LTTE communication networks ... It was possible

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<sup>72</sup> *ibid.*, p.100.

<sup>73</sup> *ibid.*, p.110.

<sup>74</sup> *ibid.*, pp.118, 122.



to keep track of progress of our patrols by listening to LTTE radio frequencies.<sup>75</sup>

- ***IPKF jamming of LTTE communications***

In addition to monitoring LTTE communications for COMINT and DF purposes, the IPKF would frequently jam the LTTE transmissions. According to Lt Gen Depinder Singh:

[The LTTE's use of receiver sets that] could lock on to any one of ten pre-set frequencies ... initially posed problems of interception, but [these] were overcome by utilising captured sets. For jamming LTTE transmissions, a captured set would be utilised to generate the required frequency which would be amplified. This proved effective.<sup>76</sup>

#### ***LTTE Communications Security (COMSEC)***

The LTTE was aware that its radio transmissions were vulnerable to interception and exploitation by the IPKF and Sri Lankan security forces, and adopted some fairly sophisticated COMSEC practices - including frequency-hopping transmissions, and the use of codes and ciphers. As Lt Gen Sardeshpande has reported:

The LTTE was also fast to learn, innovative in hardening transmissions and adept of misleading us. Their codes, frequency hopping and methods of transmission became more and more sophisticated. In later months their ground communications and courier system became so efficient that they totally stopped VHF communications in Jaffna Peninsula (and also the Trincomalee Sector). It was indeed hard to break these simple systems ...

[The LTTE] had enviable expertise in flexible, innovative, reliable and effective communication systems including codes and ciphers, rarely matched by any other insurgent group the world over.<sup>77</sup>

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<sup>75</sup> *ibid.*, pp.124, 147.

<sup>76</sup> *ibid.*, p.155.

<sup>77</sup> Sardeshpande, *Assignment Jaffna*, pp.10-11, 28.

## 94 *Signals Intelligence (SIGINT) in South Asia*

However, the improvement in the LTTE's COMSEC practices proved ultimately to be of little avail. Sophisticated techniques (such as frequency hopping and encryption) were adopted only at the base level, and even there practices were frequently poor. COMSEC was rudimentary at the field level. The vulnerability of its communications was the LTTE's weakest point. As one commentator noted:

The IPKF's biggest achievement has been the smashing of the LTTE's communication network. With the walkie-talkies going out of action for fear of interception, a yawning gulf has developed between the LTTE cadres and the leadership.<sup>78</sup>

### *LTTE SIGINT Activities*

The principal Tamil insurgent group, the Liberation Tigers of Tamil Eelam, monitored Indian and Sri Lankan military, police and security agency communications. For example, the LTTE maintained a station near Vedaranniyam on the southeastern tip of India, which monitored Tamil Nadu Police messages.<sup>79</sup>

SIGINT was also used by the LTTE in planning military operations against the IPKF. For example, SIGINT was used by the LTTE to prepare an ambush for an Indian paratroop/commando attack on the LTTE HQ/Command Centre on 11-12 October 1987. According to one account:

The LTTE was in fact waiting for the Indians to land - the Tigers had been intercepting the IPKF communications carelessly transmitted to AN PRC-25 VHF sets including the operational details of attacking the LTTE HQ (Command Centre).<sup>80</sup>

(The AN/PRC-25 system used by the IPKF was an unsecure, manpack VHF/FM voice transceiver, designed in the 1950s and produced in the 1960s, which covered the 30-75.95 MHz frequency band, with a maximum transmission range of about five miles.)

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78 Anita Pratap, 'Jaffna: A Confused Populace', *India Today*, 15 December 1987, p.80.  
79 Gunaratna, *Indian Intervention in Sri Lanka*, p.443.  
80 *ibid.*, pp.242-3.

The LTTE also monitored and sometimes attempted to jam the broadcasts of other insurgent organisations, such as the PLOTE.<sup>81</sup>

### **The 1995-96 Eruption**

On 19 April 1995, the LTTE broke the truce with the Sri Lankan government and initiated a coordinated campaign of attacks on naval vessels (destroying two navy gunboats on 19 April), missile strikes against aircraft (shooting down two air force transport aircraft, with a loss of 94 lives, on 28-29 April), and widespread guerrilla activities. Again, the Sri Lankan security and defence authorities have obtained valuable intelligence concerning LTTE plans and activities by monitoring LTTE radio transmissions.

With regard to intelligence on LTTE plans, for example, 'rebel radio traffic intercepted by military intelligence' in late April 1995 reportedly revealed plans to attack naval vessels in Colombo harbour.<sup>82</sup>

With regard to intelligence concerning the conduct and outcomes of actual operations, monitoring of LTTE radio communications during and immediately following particular engagements has provided the Sri Lankan Ministry of Defence with detailed and authoritative information about LTTE casualties.

On 16 May 1995, for example, the Operational Headquarters of the Ministry of Defence released a statement on LTTE casualties 'according to radio intercepts made by the Ministry'.<sup>83</sup> The Ministry stated that intercepts of LTTE transmissions confirmed that the LTTE had suffered 181 fatalities and about 250 others seriously injured in the fighting since 19 April, and that among the fatalities was 'its senior cadre named Kali', who was killed at Periyanochchikkulam on 14 May.<sup>84</sup>

On 17 May, intercepts of LTTE radio transmissions indicated that some 30 cadres were killed and two wounded in an engagement

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81 *ibid.*, p.114.

82 'Sri Lanka: Sri Lankan Forces Kill Six Tamil Rebels', *Reuters News Service*, 1 May 1995.

83 'Sri Lanka: Defence Ministry Reports on Tamil Tiger Casualties', *BBC Monitoring Service: Asia-Pacific*, 17 May 1995.

84 *ibid.*



with Sri Lankan troops near the eastern coastal village of Thondamannar on that day.<sup>85</sup> On 10 July, on the second day of Operation *Leap Forward*, which involved intense fighting as the Sri Lankan Army advanced to the outskirts of Jaffna, intercepted LTTE transmissions spoke of 65 killed (and ordered that 'the dead [be] listed as civilian casualties').<sup>86</sup>

Monitoring of LTTE radio communications has also provided the Sri Lankan defence authorities with intelligence concerning military engagements where government forces have been besieged and without their own radio contact. For example, when LTTE guerrillas attacked an army camp at Tharavikulam in late May, the Sri Lankan military reported that: 'We know from LTTE radio intercepts that they have killed at least 25 soldiers'.<sup>87</sup>

At the beginning of October 1995, when the army launched Operation *Thunder Strike* to clear the LTTE from the northern tip of the Jaffna peninsula, in which some 200 LTTE cadres were killed, intercepted LTTE transmissions 'indicated that they were in total disarray'.<sup>88</sup>

In July 1996, the LTTE captured a large but remote Sri Lankan Army camp at Mullaitivu, about 100 kilometres north of Trincomalee, in the bloodiest battle of the 13-year-old insurgency. More than 1500 troops were stationed at the camp, which overlooked the important sea lane to Jaffna. One of the first facilities taken by the LTTE in the sprawling army camp was the Communications Centre, and for several days the army had no radio contact with the camp.<sup>89</sup> Much of the army's intelligence about the battle, including its own casualties, was obtained from monitoring LTTE clandestine broadcasts and intercepting other LTTE radio communications. The clandestine Voice of Tigers radio was monitored in the government-controlled frontline town of Vavuniya, about 100 km south-west of Mullaitivu. In a

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85 'Sri Lanka: Troops Consolidate Positions Around Palaly', *BBC Monitoring Service: Asia-Pacific*, 19 May 1995.

86 Rohan Gunasekara, 'Sri Lankan Offensive Nears Rebel Stronghold', *Washington Times*, 11 July 1995, p.15.

87 'Tamils Hit Sri Lankan Army Post, Killing 25', *International Herald Tribune*, 29 May 1995, p.4.

88 'Sri Lankan Troops Kill 200 Rebel Tamils', *Australian*, 4 October 1995, p.19.

89 Matthew Chance, 'Sri Lanka: International - Links Cut to Besieged Base', *Daily Telegraph*, 22 July 1996, p.11, in *Reuter Australasian Briefing*, 22 July 1996.



broadcast monitored in Vavuniya on 20 July, for example, the Voice of Tigers said that '800 soldiers have been killed and the LTTE has lost 120 cadres'.<sup>90</sup>

The Sri Lankan military and intelligence authorities accorded much more credence to SIGINT obtained from LTTE communications transmitted from the battle scene. On 18 July, for example, LTTE HF radio traffic intercepted by the Sri Lankan Army indicated not only that LTTE chieftain Velupillai Prabhakaran personally led that attack on the Mullaitivu camp, but, indeed, that he was 'wounded' in the attack.<sup>91</sup> Also on 18 July, 'rebel radio traffic monitored by army signals intelligence experts' revealed that more than 150 army soldiers and some 34 LTTE cadres had been killed in the attack.<sup>92</sup> On 19 July, 'military officials said privately that rebel communications they had monitored put the figure at over 400 troops killed'.<sup>93</sup> On 22 July, government sources said that 'rebel radio transmissions indicated that over 400 Liberation Tigers of Tamil Eelam had been killed and a large number wounded'.<sup>94</sup>

### Sri Lanka's Electronic Warfare (EW) Capabilities

The Sri Lankan defence forces possess very little electronic warfare capability, although some army signals units do have limited but quite modern interception and jamming capabilities, and some navy patrol craft are equipped with modern electronic support measures (ESM) systems.

For example, the three *Rana* (ex-*Shanghai II*)-class fast attack craft, acquired from China in 1991, are equipped with the BM/HZ

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90 'Sri Lanka: Sri Lanka Rebels Say 800 Troops, 120 Tigers Killed', *Reuters News Service*, 20 July 1996.

91 'Tiger Boss "Wounded" in Attack', *Canberra Times*, 20 July 1996, p.8; and 'Sri Lanka: Government Says Troops Continue to Hold Mullaitivu Base', *BBC Monitoring Service: Asia-Pacific*, 22 July 1996 in *Reuter Australasian Briefing*, 22 July 1996.

92 'Tamil Rebels Overrun Sri Lankan Base, Killing 150', *New York Times*, 19 July 1996, p.4; 'Sri Lanka: Political and Civil Unrest', *Lloyd's Information Casualty Report*, 19 July 1996 in *Reuter Australasian Briefing*, 19 July 1996; and Rohan Gunasekara, 'Sri Lanka: Sri Lanka Rebels Say 150 Troops Killed in Attack', *Reuters News Service*, 18 July 1996.

93 'Sri Lanka: Political and Civil Unrest', *Lloyd's Information Casualty Report*, 20 July 1996 in *Reuter Australasian Briefing*, 20 July 1996.

94 Mohan Samarasinghe, 'Sri Lanka: Sri Lanka Rebels Hand Over Bodies of Slain Troops', *Reuters News Service*, 22 July 1996.

8610 electronic support measures system produced by the Southwest China Research Institute of Electronic Equipment in Chengdu. The BM/HZ 8610 is a high-sensitivity and accurate ESM system which provides direction finding (2.5 RMS) and analysis and identification of threat radar equipment over the 2-8 GHz and 7.5-18 GHz frequency bands.<sup>95</sup>

### US SIGINT Activities in Sri Lanka

It is alleged from time to time that the United States has been involved in SIGINT activity of some sort or another in Sri Lanka. These allegations, which were most frequent during the 1970s and through the mid-1980s, included claims that the US Embassy in Colombo was being used for SIGINT purposes, that the US National Security Agency (NSA) established a liaison and advisory relationship with Colombo in the early 1980s,<sup>96</sup> and that the United States had been permitted to establish a SIGINT station at Trincomalee.

It has often been reported, particularly in the Indian media, that the United States established a SIGINT facility 'for eavesdropping on India' at the Voice of America (VoA) radio station at Trincomalee in the early 1980s.<sup>97</sup> For example, the Indian High Commissioner in Sri Lanka, J.N. Dixit, stated in March 1989 that the United States had been allowed 'to install highly sophisticated monitoring equipment on Sri Lankan soil which could have affected our security in terms of their capacity to monitor our sensitive information for their own interests'.<sup>98</sup> These reports have been denied by US authorities. For example, the US Ambassador to Sri Lanka in the late 1980s, James W. Spain, has said that:

On the VoA station, I recall telling Dixit, 'Stop this nonsense. The VoA facility here is not for eavesdropping on India. If we

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<sup>95</sup> Sharpe (ed.), *Jane's Fighting Ships, 1991-92*, p.509; Norman Friedman, *The Naval Institute Guide to World Naval Weapons Systems: 1994 Update* (Naval Institute Press, Annapolis, Maryland, 1994), p.53; and 'BM/HZ 8610 ESM System' in Blake (ed.), *Jane's Radar and Electronic Warfare Systems, 1990-91*, p.380.

<sup>96</sup> See, for example, claims cited in Gunaratna, *Indian Intervention in Sri Lanka*, p.31.

<sup>97</sup> See, for example, *ibid.*, p.15.

<sup>98</sup> Cited in *ibid.*, p.208.

wanted to spy on your security installations, we have other ways. That is not our intention'.<sup>99</sup>

### **Russian SIGINT Activities in Sri Lanka**

The Russian Embassy in Sri Lanka is located at 62 Sir Ernest de Silva Mawatha, about 3 km south of downtown Colombo (the 'Fort'), in an area which has several Embassies.

There are more than half a dozen antennas in the Embassy compound, including:

- (i) a *Birdcage-2* HF broadband system, running northeast-southwest from the roof of the Chancery to one of the buildings behind;
- (ii) a *Birdcage-1* HF broadband system, which runs parallel to the *Birdcage-2*;
- (iii) a HF wire system, with two wires and a central feed, strung northwest-southeast across the roof of the Chancery;
- (iv) a single HF wire system with a central feed, also strung across the roof of the Chancery;
- (v) a VHF system on a tall mast at the northern edge of the compound;
- (vi) a VHF system on the roof of one of the buildings at the rear (the west) of the compound; and
- (vii) a four-element *Ekran* UHF satellite communications (SATCOM) antenna in the north-west of the compound, oriented up to the north-east.

In addition to their diplomatic communications (transmission and reception) functions, these antenna systems are also used by Russian SIGINT units stationed in the Embassy to monitor a wide range of signals, including:

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<sup>99</sup> *ibid.*, p.15.



## 100 *Signals Intelligence (SIGINT) in South Asia*

- *Diplomatic communications*

The four HF antenna systems are capable of monitoring diplomatic communications with Colombo, including both those of Sri Lanka's own overseas posts and those of other countries with diplomatic missions in Colombo.

- *Internal political and militant communications*

The HF and VHF antennas are also likely to be used for monitoring internal radio communications, including both Sri Lankan intelligence, military, security and police communications, and LTTE communications between Jaffna and other bases (including those in Tamil Nadu).

- *UHF satellite communications*

The *Ekran* SATCOM antenna could be used to monitor interesting and accessible UHF SATCOM transmissions, including the INMARSAT maritime satellite communications system, which is widely used by numerous US and other defence agencies (including the US Navy),<sup>100</sup> and the Indian communications satellite (COMSAT) system, which was used (for example) by the IPKF for communications between New Delhi, Madras, Jaffna and Trincomalee during Operation *Pawan*.<sup>101</sup>

- *Trincomalee*

In the early 1980s, a Soviet signals intelligence ship was stationed off the east coast to monitor and jam transmissions from the VoA station at Trincomalee.

## Conclusions

During the Second World War, Ceylon (Sri Lanka) was the site of important Allied SIGINT activities concerning the Southeast Asian theatre. The Admiralty/GCCS station at HMS *Anderson* at Colombo succeeded in intercepting and decrypting a wide range of encrypted

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<sup>100</sup> See Desmond Ball, *Soviet Signals Intelligence (SIGINT): Intercepting Satellite Communications*, Canberra Papers on Strategy and Defence No.53 (Strategic and Defence Studies Centre, Australian National University, Canberra, 1989), pp.21-4, 79, 91-2.

<sup>101</sup> Singh, *The IPKF in Sri Lanka*, p.36.



Japanese naval signals, and contributed to the success of the naval war in the Pacific and eastern Indian Ocean. The SIGINT activity at Peradeniya, near Kandy, provided Lord Mountbatten's South East Asia Command and its subordinate air and ground headquarters' with SIGINT required for strategic and operational planning. The DF stations at *Anderson*, Powder Island (Trincomalee) and Hambantota were important elements of the Admiralty's world-wide HF DF network. However, it seems that nothing of these capabilities was retained in Ceylon following the end of the war, or at least after Ceylon's achievement of independence in 1948.

Other countries may have taken advantage of Sri Lanka and conducted their own SIGINT activities - as the Russians have long done at their Embassy compound, and as the United States may possibly also have done.

But for three and a half decades, Sri Lanka itself essentially lacked any SIGINT capabilities whatsoever, beyond those inherent in the modest signals reception capabilities of the army's signals units and some police units. With the onset of the civil insurgency in the early 1980s, both Sri Lankan defence and security agencies developed radio surveillance and interception capabilities. The army's Signal Corps has also been progressively modernised.

SIGINT has been very important in the fight against the Tamil insurgents. The IPKF found during its period in Sri Lanka (1987-91) that SIGINT provided 90 per cent of its tactical intelligence about the LTTE.<sup>102</sup> It provided the IPKF with intelligence concerning LTTE plans and preparations, logistic activities and problems, order of battle, and battle casualties. The vulnerability of the LTTE's communications network eventually proved to be its weakest point.

The LTTE has been too dependent upon radio communications. This was partly a function of geography, for when the LTTE's network of HF radio trunk lines and FM radio connections was established in the mid-1980s, major elements were located across the Palk Strait in Tamil Nadu State in India. In 1987, when Indian authorities moved to close down LTTE bases and facilities in Tamil Nadu, many of them had already been located and identified by Indian SIGINT agencies monitoring their HF and VHF transmissions.

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<sup>102</sup> Deva, 'Communications Issues', p.79.

Within northeastern Sri Lanka itself, the excessive utilisation of radio communications by the LTTE is mainly a product of the ready availability of cheap Japanese CB radios and walkie-talkies. Some elements of the LTTE's command and communications system have exhibited sophisticated communications security practices (such as frequency hopping and encryption), but most field communications have no COMSEC protection apart from some improvised codes. Monitoring these communications has provided the Sri Lankan authorities with their most lucrative source of intelligence concerning the LTTE's tactical activities. It has provided detailed and authoritative intelligence on a regular basis about the LTTE's plans and preparations, deployments and movements, casualties and housekeeping activities.

The SIGINT capabilities of the Sri Lankan security and defence forces remain quite modest. Some modern radio surveillance, interception and DF equipment has been acquired over the past decade from Israel, the United Kingdom and the United States, but most of their capabilities are still very basic. Much of the radio-monitoring equipment has been acquired from commercial sources. But against insurgents who use radio excessively, and also use unsophisticated radio systems and poor COMSEC techniques, they are frequently able to collect valuable intelligence. Indeed, not only has radio monitoring provided the Sri Lankan authorities with their best intelligence concerning LTTE tactical activities; but focusing on their communications nets also offers the most promising means of containing the LTTE's guerrilla operations while the basis for a more lasting peace can be found.

# BIBLIOGRAPHY

## Books, Monographs and Working Papers

- Ahmed, Brigadier Gulzar, *Pakistan Meets Indian Challenge* (Al Mukhtar Publishers, Rawalpindi, 1967).
- Andrew, Christopher, *The Growth of Intelligence Collaboration in the English-Speaking World*, Working Paper No.83 (International Security Studies Program, The Wilson Center, Washington DC, 1987).
- Ball, Desmond, *Pine Gap: Australia and the US Geostationary Signals Intelligence Satellite Program* (Allen & Unwin, Sydney, 1988).
- Ball, Desmond, *Soviet Signals Intelligence (SIGINT): Listening to ASEAN*, Working Paper No.188 (Strategic and Defence Studies Centre, Australian National University, Canberra, September 1989).
- Ball, Desmond, *Soviet Signals Intelligence (SIGINT): Intercepting Satellite Communications*, Canberra Papers on Strategy and Defence No.53 (Strategic and Defence Studies Centre, Australian National University, Canberra, 1989).
- Ball, Desmond, *Soviet SIGINT: Hawaii Operation*, Canberra Papers on Strategy and Defence No.80 (Strategic and Defence Studies Centre, Australian National University, Canberra, 1991).
- Ball, Desmond, *Signals Intelligence in the Post-Cold War Era: Developments in the Asia-Pacific Region* (Institute of Southeast Asian Studies, Singapore, 1993).
- Ball, Desmond, *Developments in Signals Intelligence and Electronic Warfare in Southeast Asia*, Working Paper No.290 (Strategic and Defence Studies Centre, Australian National University, Canberra, 1995).
- Ball, Desmond, *Signals Intelligence (SIGINT) in South Korea*, Canberra Papers on Strategy and Defence No.110 (Strategic and Defence Studies Centre, Australian National University, Canberra, 1995).
- Ball, Desmond, *Signals Intelligence (SIGINT) in North Korea*, Working Paper 295 (Strategic and Defence Studies Centre, Australian National University, Canberra, 1996).
- Ballard, Geoffrey St. Vincent, *On Ultra Active Service: The Story of Australia's Signals Intelligence Operations during World War II* (Spectrum Publications, Richmond, Victoria, 1991).
- Blake, Bernard (ed.), *Jane's Radar and Electronic Warfare Systems, 1990-91* (Jane's Information Group, Coulsdon, Surrey, 2nd edn 1990).



104 *Signals Intelligence (SIGINT) in South Asia*

- Blake, Bernard (ed.), *Jane's Radar and Electronic Warfare Systems, 1995-96* (Jane's Information Group, Coulsdon, Surrey, 7th edn 1995).
- de Arcangelis, Mario, *Electronic Warfare: From the Battle of Tsushima to the Falklands and Lebanon Conflicts* (Blandford Press, Poole, Dorset, 1985).
- Friedman, Norman, *The Naval Institute Guide to World Naval Weapons Systems: 1994 Update* (Naval Institute Press, Annapolis, Maryland, 1994).
- Gray, Edwyn, *Operation Pacific: The Royal Navy's War against Japan, 1941-1945* (Leo Cooper, London, 1990).
- Gunaratna, Rohan, *War & Peace in Sri Lanka* (Institute of Fundamental Studies, Colombo, 1987).
- Gunaratna, Rohan, *Indian Intervention in Sri Lanka: The Role of India's Intelligence Agencies* (South Asian Network on Conflict Research, Colombo, 1993).
- Hinsley, F.H. and Alan Stripp (eds), *Codebreakers: The Inside Story of Bletchley Park* (Oxford University Press, Oxford, 1993).
- Jordan, John, *Soviet Submarines: 1945 to the Present* (Arms and Armour Press, London, 1989).
- Kennedy, Colonel William V., *Intelligence Warfare* (Crescent Books, New York, 1983).
- Khan, Major General Akbar (Retd), *Raiders in Kashmir* (Pak Publishers Limited, Karachi, 1970)
- Lohbeck, Kurt, *Holy War, Unholy Victory: Eyewitness to the CIA's Secret War in Afghanistan* (Regnery Gateway, Washington DC, 1993).
- Mohandas, K., *MGR: The Man and the Myth* (Panther Publishers, Bangalore, 1992).
- Musa, General Mohammad (Retd), *My Version: India-Pakistan War 1965* (Wajidalis, Lahore, 1st Edition, 1983).
- Praval, Major K.C., *Indian Army After Independence* (Lancer International, New Delhi, 1990).
- Pretty, R.T. (ed.), *Jane's Weapon Systems 1978* (Macdonald and Jane's Publishers Limited, London, 9th edn 1977).
- Raina, Asoka, *Inside RAW: The Story of India's Secret Service* (Vikas Publishing House, New Delhi, 1981).
- Rao, General K.V. Krishna, *Prepare or Perish: A Study of National Security* (Lancer Publishers, New Delhi, 1991).
- Rusbridger, James and Eric Nave, *Betrayal at Pearl Harbor: How Churchill Lured Roosevelt into World War II* (Summit Books, New York, 1991).



- Salik, Siddiq, *Witness to Surrender* (Oxford University Press, Karachi, 1977).
- Sardeshpande, Lt Gen S.C., *Assignment Jaffna* (Lancer Publishers, New Delhi, 1992).
- Sharpe, Captain Richard, RN (ed.), *Jane's Fighting Ships, 1991-92* (Jane's Information Group, Coulsdon, Surrey, 94th edn 1991).
- Singh, Lt Col (Retd) Bhupinder, *1965 War: Role of Tanks in India-Pakistan War* (B.C. Publishers, Patiala, Punjab, 1982).
- Singh, Lt Col (Retd) Bhupinder, *Indo-Pak Conflicts over Kashmir* (B.C. Publishers, Patiala, Punjab, 1983).
- Singh, Lt Gen Depinder, *The IPKF in Sri Lanka* (Trishul Publications, New Delhi, 1992).
- Skillen, Hugh, *Spies of the Airwaves: A History of Y Sections during the Second World War* (Hugh Skillen, Pinner, Middlesex, 1989).
- Skillen, Hugh, *Knowledge Strengthens The Arm* (Hugh Skillen, Pinner, Middlesex, 1991).
- Stripp, Alan, *Codebreaker in the Far East* (Frank Cass, London, 1989).
- Sweetman, Bill and Bill Gunston, *Soviet Air Power* (Salamander Books, London, 1978).
- Taylor, John W.R. (ed.), *Jane's All the World's Aircraft, 1986-87* (Jane's Publishing Company, London, 1986).
- The International Countermeasures Handbook* (Cardiff Publishing, Englewood, Colorado, 15th edn 1990).
- van der Aart, Dick, *Aerial Espionage: Secret Intelligence Flights by East and West* (Arco/Prentice Hall Press, New York, 1985).
- West, Nigel, *GCHQ: The Secret Wireless War, 1900-86* (Weidenfeld and Nicolson, London, 1986).
- Williamson, John (ed.), *Jane's Military Communications, 1990-91* (Jane's Information Group, Coulsdon, Surrey, 11th edn 1990).
- Winterbotham, F.W., *The Ultra Secret* (Future Publications, London, 1975).
- Winton, John, *Sink the Haguro! The Last Destroyer Action of the Second World War* (Seeley, Service & Co. Ltd, London, 1978).
- Yousaf, Brigadier Mohammad and Major Mark Adkin, *The Bear Trap: Afghanistan's Untold Story* (Leo Cooper, London, 1992).

### Book Chapters and Journal Articles

- 'Activities of Dr Marshall H. Stone, 9 April 1945' in Ronald H. Spector (ed.), *Listening to the Enemy: Key Documents on the Role of*

- Communications Intelligence in the War with Japan* (Scholarly Resources Inc., Wilmington, Delaware, 1988).
- Ball, Desmond, 'Soviet Signals Intelligence: The Use of Diplomatic Establishments' in Floyd C. Painter (ed.), *The International Countermeasures Handbook* (EW Communications, Palo Alto, California, 13th edn 1988).
- Ball, Desmond, 'Signals Intelligence (SIGINT) in Pakistan', *Strategic Analysis*, Vol.XVIII, No.2, May 1995.
- Ball, Desmond, 'Signals Intelligence in India', *Intelligence and National Security*, Vol.10, No.3, July 1995.
- Ball, Desmond, 'Signals Intelligence in China', *Jane's Intelligence Review*, Vol.7, No.8, August 1995.
- Ball, Desmond, 'Signals Intelligence in Taiwan', *Jane's Intelligence Review*, Vol.7, No.11, November 1995.
- Ball, Desmond, 'Signals Intelligence (SIGINT) in Sri Lanka', *Strategic Analysis*, Vol.XVIII, No.8, November 1995.
- Ball, Desmond, 'Over and Out: Signals Intelligence (SIGINT) in Hong Kong', *Intelligence and National Security*, Vol.11, No.3, July 1996.
- Bedi, Rahul, 'Is Peace Possible in Troubled Kashmir?', *Jane's Intelligence Review*, August 1996.
- 'BM/HZ 8610 ESM System' in Bernard Blake (ed.), *Jane's Radar and Electronic Warfare Systems, 1990-91* (Jane's Information Group, Coulsdon, Surrey, 2nd edn 1990).
- 'Celtic HF/DF Systems' in Bernard Blake (ed.), *Jane's Radar and Electronic Warfare Systems, 1995-96* (Jane's Information Group, Coulsdon, Surrey, 7th edn 1995).
- Denham, Hugh, 'Bedford-Bletchley-Kilindini-Colombo' in F.H. Hinsley and Alan Stripp (eds), *Codebreakers: The Inside Story of Bletchley Park* (Oxford University Press, Oxford, 1993).
- Denniston, A.G., 'The Government Code and Cypher School between the Wars' in Christopher Andrew (ed.), *Codebreaking and Signals Intelligence* (Frank Cass, London, 1986).
- Deva, Yashwant, 'Signal Intelligence: Concepts, Trends and Issues', *Strategic Analysis*, Vol.XIV, No.4, July 1991.
- 'Direction Finding at Monitoring Stations' (Report 372/1, International Radio Consultative Committee, XII Plenary Assembly, New Delhi, 1970) in *Spectrum Utilisation and Monitoring* (International Telecommunication Union, Geneva, 1970), Vol.1.
- Gunasekara, Rohan, 'The Sri Lanka Army Reshapes for War on Two Fronts', *International Defense Review*, June 1990.

- 'Indian "Kilo" Submarine Underway', *Jane's Soviet Intelligence Review*, Vol.1, No.1, January 1989.
- 'Intelligence: The Making or Breaking of India's Singh Administration?', *Defense & Foreign Affairs*, Vol.18, No.8, August 1990.
- Kasturi, Bhashyam, 'Military Intelligence in India: An Analysis', *Indian Defence Review*, Vol.9, No.1, January 1994.
- Popli, Major-General M.L., 'What Ails Our Intelligence System?', *Indian Defence Review*, January 1991.
- Popli, Major-General M.L., 'National Intelligence Assessments and Estimates: Whither Our Joint Intelligence Committee?', *Indian Defence Review*, October 1991.
- 'RA 1792 Receiver' in Bernard Blake (ed.), *Jane's Radar and Electronic Warfare Systems, 1990-91* (Jane's Information Group, Coulsdon, Surrey, 2nd edn 1990).
- 'RA 1795 VHF/UHF Receiver' in John Williamson (ed.), *Jane's Military Communications, 1990-91* (Jane's Information Group, Coulsdon, Surrey, 11th edn 1990).
- 'RA 1975 Receiver', Bernard Blake (ed.), *Jane's Radar and Electronic Warfare Systems, 1990-91* (Jane's Information Group, Coulsdon, Surrey, 2nd edn 1990).
- Riggell, John and Arthur Bates, '10 SWS/131 SWS/Hong Kong Centre' in Hugh Skillen (ed.), *The Enigma Symposium 1995* (Hugh Skillen, Pinner, Middlesex, 1995).
- Sengupta, Prasun, 'China Expands Air Forces: Implications for Asia-Pacific Balance of Military Power', *Military Technology*, August 1992.
- Skillen, Hugh, 'MEACONS and M. Type W/T Sections' in Hugh Skillen (ed.), *The Enigma Symposium 1995* (Hugh Skillen, Pinner, Middlesex, 1995).
- Stripp, Alan, 'Japanese Army Air Force Codes at Bletchley Park and Delhi' in F.H. Hinsley and Alan Stripp (eds), *Codebreakers: The Inside Story of Bletchley Park* (Oxford University Press, Oxford, 1993).
- Taylor, John W.R. and Kenneth Munson, 'Gallery of Asian and Pacific Airpower', *Air Force Magazine*, November 1990.
- Vaughn, Bruce, 'The Use and Abuse of Intelligence Services in India', *Intelligence and National Security*, Vol.8, No.1, January 1993.



**News Reports and Newspaper Articles**

- Ali, Salamat, 'Bugging Ploy Backfires', *Far Eastern Economic Review*, 1 September 1988.
- Ali, Salamat, 'Tarnished Brass: Scandal Over Soldiers Playing Politics', *Far Eastern Economic Review*, 15 October 1992.
- Badhwar, Inderjit, 'Central Intelligence Agency: The Indian Connection', *India Today*, 31 December 1983.
- Bobb, Dilip, 'Spying or Crying?', *India Today*, 16-31 August 1980.
- Bobb, Dilip, 'Blunting the Edge', *India Today*, 1-15 December 1980.
- Bobb, Dilip and Shekhar Gupta, 'Intelligence Agencies: The Spy Trade', *India Today*, 31 December 1983.
- Chance, Matthew, 'Sri Lanka: International - Links Cut to Besieged Base', *Daily Telegraph*, 22 July 1996 in *Reuter Australasian Briefing*, 22 July 1995.
- 'Changing Spies', *The Economist*, Vol.322, No.7749, 7 March 1992.
- Coughlin, William J., 'U.S. Is Dismantling Peshawar Spy Base', *Washington Post*, 10 April 1969.
- Coughlin, William J., 'U.S. Spy Base in India Eyes China Atom, Missile Activities: Shifted From Pakistan in 1969', *International Herald Tribune*, 26-27 June 1971.
- Crosette, Barbara, 'India Foreign TV Monitor Sights "Alien Influences"', *International Herald Tribune*, 13 June 1991.
- Defense Marketing Service (DMS), 'Hermes', *DMS Market Intelligence Report* (DMS Inc., Greenwich, Connecticut, August 1988).
- Deva, Yashwant, 'Communication Issues: Of Pawan and the Assassination', *Frontline*, 28 February 1992.
- Gunasekara, Rohan, 'Sri Lankan Offensive Nears Rebel Stronghold', *Washington Times*, 11 July 1995.
- Gunasekera, Rohan, 'Sri Lanka: Sri Lanka Rebels Say 150 Troops Killed in Attack', *Reuters News Service*, 18 July 1996.
- Gupta, Shekhar, 'Charbatia: Secret Base', *India Today*, 31 December 1983.
- Inderjit, Badhwar, 'Central Intelligence Agency: The Indian Connection', *India Today*, 31 December 1983.
- 'Indian Government Building Earth Station "to Monitor Foreign TV"', *Straits Times*, 6 December 1991.
- Jain, Madhu and W.P.S. Sidhu, 'Satellite TV: Battle for the Box - Foreign Networks Place Government in a Quandary', *India Today*, 31 March 1992.

- Joshi, Manoj, 'Signal Wars: Indian Capability in Perspective', *Frontline*, 10 September 1983.
- Joshi, Manoj, 'Next-Door Diplomacy: India and Emerging Imperatives', *Frontline*, 3 July 1992.
- Joshi, Manoj, 'Snooping in Style', *Frontline*, 10 September 1993.
- Kelliher, Adam, 'India Gets Soviet "Eyes"', *Australian*, 11 April 1988.
- 'KGB in Asia', *Far Eastern Economic Review*, 31 December 1976.
- Lifschultz, Lawrence, 'New U.S. Spy Flights from Pakistan', *The Nation*, 29 November 1986.
- "Massive Military Construction in Pak", *Hindustan Times*, 13 October 1987.
- McGee, Jim, 'Expert Backs Pakistan on Crash Cause: Mechanical Failure of Zia Plane Ruled Out; Sabotage Suggested', *Washington Post*, 21 October 1988.
- Middleton, Karen, 'India, Iran Spied on Australian Ships Going to Gulf', *Telegraph Mirror* (Sydney), 14 October 1994.
- Mohamed, Khalid, 'Project to Intercept Satellite Signals', *Sunday Times* (Bombay), 9 June 1991.
- 'Obituaries: Lt-Cdr Teddy Poulden', *Daily Telegraph* (London), 20 November 1992.
- 'Pakistan Replaces Army Intelligence Chief', *Washington Times*, 3 March 1992.
- 'Pakistan Updates Maritime Aircraft', *Jane's Defence Weekly*, 20 November 1993.
- 'Pakistan: Orion Export on Hold', *Jane's Defence Weekly*, 9 May 1992.
- Pratap, Aniota, 'Jaffna: A Confused Populace', *India Today*, 15 December 1987.
- Rashid, Ahmed, 'Showing Her Steel: Bhutto Asserts Control by Sacking Intelligence Chief', *Far Eastern Economic Review*, 8 June 1989.
- 'RAW Staff Refute Claim by Officials', *Times of India*, 7 December 1980.
- Samarasinghe, Mohan, 'Sri Lanka: Sri Lanka Rebels Hand Over Bodies of Slain Troops', *Reuters News Service*, 22 July 1996.
- Sawhney, Pravin, 'India to Get US Electronic Warfare Aids', *Sunday Times* (New Delhi), 3 November 1991.
- 'Sri Lanka: Defence Ministry Reports on Tamil Tiger Casualties', *BBC Monitoring Service: Asia-Pacific*, 17 May 1995.
- 'Sri Lanka: Government Says Troops Continue to Hold Mullaittivu Base', *BBC Monitoring Service: Asia-Pacific*, 22 July 1996 in *Reuter Australasian Briefing*, 22 July 1996.

## 110 *Signals Intelligence (SIGINT) in South Asia*

- 'Sri Lanka: Political and Civil Unrest', *Lloyd's Information Casualty Report*, 19 July 1996 in *Reuter Australasian Briefing*, 19 July 1996.
- 'Sri Lanka: Political and Civil Unrest', *Lloyd's Information Casualty Report*, 20 July 1996 in *Reuter Australasian Briefing*, 20 July 1996.
- 'Sri Lanka: Sri Lanka Rebels Say 800 Troops, 120 Tigers Killed', *Reuters News Service*, 20 July 1996.
- 'Sri Lanka: Sri Lankan Forces Kill Six Tamil Rebels', *Reuters News Service*, 1 May 1995.
- 'Sri Lanka: Troops Consolidate Positions Around Palaly', *BBC Monitoring Service: Asia-Pacific*, 19 May 1995.
- 'Sri Lankan Troops Kill 200 Rebel Tamils', *Australian*, 4 October 1995.
- Srinivasan, S., 'Intelligence Plane Crashed in Orissa', *Telegraph* (Calcutta), 11 March 1988.
- 'Strategy's Friends', *Toronto Globe & Mail*, 16 December 1986.
- 'Tamil Rebels Overrun Sri Lankan Base, Killing 150', *New York Times*, 19 July 1996.
- 'Tamils Hit Sri Lankan Army Post, Killing 25', *International Herald Tribune*, 29 May 1995.
- 'The RAW Truth', *India Today*, 15 February 1990.
- 'Tiger Boss "Wounded" in Attack', *Canberra Times*, 20 July 1996.
- 'Tuning In', *Time*, 8 March 1982.
- Weatherall, Ernest, 'Pakistan Orders Closure of U.S. Listening Post', *Christian Science Monitor*, 28 May 1968.
- Weatherall, Ernest, 'Bada Bier Exit Ends U.S. "Spy" Era', *Christian Science Monitor*, 14 January 1970.

### Official Sources

- Desai, Prime Minister Morarji, *Lok Sabha Debates*, Sixth Series, No.38, 17 April 1978.
- 'DF Stations Building or Projected', Memo from the Secretary of the Admiralty, London, to the Secretary of Naval Office, Melbourne, 1 February 1940.
- 'DF Stations in Operation for Naval Services', Memo from the Secretary of the Admiralty, London, to the Secretary of Naval Office, Melbourne, 1 February 1940.
- Headquarters United States European Command, *COMSEC Assessment During October 1973 Mid-East Conflict* (HQ USEUCOM, Vaihingen, Germany, ECJ-A-73-0045-S, December 1973).



- Pierson, James E., *A Historical Study of the Organizational Development of United States Air Force Security Service 1970-1974* (United States Air Force Security Service, San Antonio, Texas, 15 September 1974).
- Radio Warfare*, Technical Staff Monographs 1939-1945, C.B. 03209 (Signal Division, Admiralty, London, 1949).
- Yale, Harvey, *Close Out of the 6937th Communications Group Peshawar Pakistan* (Air Force Office of History, Washington DC, 1970).

### Other Material

- Stripp, Alan, 'Breaking Japanese Codes' (Mimeo).

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116 *Signals Intelligence (SIGINT) in South Asia*

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**T**HIS monograph is a study of signals intelligence (SIGINT) activities in South Asia. It describes the history of these activities from the early stations set up in India by the British, through intelligence operations during the Second World War and during the three India-Pakistan wars, to Sri Lanka's operations against Tamil militants. It also describes the higher command and management structures and the intelligence establishments in India, Pakistan and Sri Lanka; the organisational aspects of the numerous agencies involved in SIGINT activities, and their facilities and capabilities; and it discusses the efficiency of the SIGINT organisations in the three countries, as well as their operational effectiveness.